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Sternbach

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FUTURE

LIFE

#17 MARCH 1980

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ON THE COVER: The spacefaring dolphin is described in detail by the artist in this issue's Portfolio, beginning on page 70. © 1980 by Rick Sternbach.

ON THE CONTENTS PAGE: Disney's version of a black hole. The new technology invented for the film is revealed in the story beginning page 38.

Faster Than a Speeding Bullet...

I have lived on airplanes so much lately that I really don't feel comfortable when I sit down to dinner without a tray table shoved in my lap and my feet resting on a piece of carry-on luggage.

In the past three months, I've been to Palm Springs, Las Vegas, Los Angeles, Puerto Rico, St. Thomas, St. Croix and St. John, Austin, Lafayette, New Orleans and *twice* to London. I've flown everything from a 15-passenger prop plane to a supersonic Concorde.

I don't have the patience to add up the air miles, but it's a lot! And yet, compared to many businessmen I'm not really much of a traveller.

I can vividly remember my *first* airplane trip. It consisted of about 45 minutes of rough, noisy, low-altitude flying and was one of the most exciting experiences of my youth. I felt that same youthful thrill 25 years later when the Concorde jumped forward and the cabin indicator showed "M-1" and then "M-2"—*twice the speed of sound*. We travelled so high that the sky was almost black above, and all air currents and weather conditions were well below us. Another five miles higher and we would have been at the threshold of space.

When I was a small boy, my mother told me that we would probably land on the Moon during my lifetime. "I will not live to see it," she said, "but *you* will."

Guess what. Here it is, more than ten years *after* we first set foot on the Moon, and my mother is alive and sassy as ever.

Nowadays, when I talk with young people, I tell them that *they* will probably be able to travel into space during their lifetime, but who knows—maybe I'll vacation on a luxury space station during my remaining years. After all, I've come close to space already. What a thought!

The movement of civilization is faster than anyone realizes, and one of the main areas of progress is in the movement of people and things—*transportation*.

Ten centuries ago, a man was brave if he left his village and made it to the next town. Two centuries ago, American pioneers were hearty enough to endure months of rough travel crossing the continent. Less than one century ago the airplane was invented. Last month I hopped across the Atlantic Ocean in less than three and a half hours.

The fuel crisis will require some innovative new transportation systems (who knows what?), but even without that need, faster physical movement is one of the *constant* goals of technology.

Supersonic jets that now include private sleeping cabins are making it possible for the Japanese to become incredible global businessmen. Standard freight jets make it possible for natives of the Caribbean islands to eat strawberries and tomatoes for the first time in their lives. And private pleasure planes (unheard of 50 years ago) make it possible for four friends to have dinner at a restaurant in another state and return home in time to watch the 11:00 news.

And on the horizon are plans to build an underground air-pressure train system that will take people from New York to Los Angeles in less than 45-minutes at a top speed that approaches 5,000 mph.

That's some indication of the transportation speed-up that future years hold for us. Perhaps a century from now *physical teleportation* will be so commonplace that people will look back on supersonic jets as if they were as primitive as covered wagons.

Teleportation, I might add, will be so rapid that there will be no time for luke-warm meals on little plastic trays squeezed into your lap. That's another advantage of future progress: It overcomes the disadvantages of current progress.

—Kerry O'Quinn/Publisher

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FUN IN ZERO-G

...The article entitled "Lovers, Colonists & Explorers" in FUTURE LIFE #15 was great. I'm 17 years old and I am looking forward to the time when we can colonize space. My only problem was trying to convince my girlfriend to go with me when we get married in a few years. I figure by the time we're married it will be all set for space settlers. The paragraphs on sex in zero-g really helped me convince my girlfriend of the good aspects of space. I know there are going to be a lot of narrow-minded people who'll hate those paragraphs, but that is their problem. I say just do what comes naturally. Thanks, and keep up the good work.

D. Graves
Chicago, IL

THE FAMILY THAT PLAYS TOGETHER...

...In your article "Lovers, Colonists & Explorers" (FUTURE LIFE #15), mention was made of a belt to keep zero-g lovers together. "It may be of pink latex or nylon, with holes for four legs..."

Simple. How about some variety—say holes for six or eight legs? Sure, pink latex is okay for rubber freaks, but how about leather fans? Fur or silk could be used—even panty hose could be tied up in an emergency. Maybe a shiny cold aluminum chain with big links, burlap sack or emery cloth would suit the tastes of S&M fans (whips are sure to be big sellers for pushing off walls).

Space may be a kinky new frontier.
Name Withheld By Request.

ARMCHAIR EDITOR

...Hello? Is anybody there? I was looking for an editor with a sufficient understanding of grammar to keep track of Carolyn Henson. "... helping my husband and I prepare a technical paper..."? "...us pioneers will need good neighbors..."? Maybe I am the only one who notices these things, but it's my opinion that such careless use of the English language can make an otherwise decent magazine appear amateurish, which could make it ineffectual with influential people.

Also in your issue #15 was the interesting book excerpt by T.A. Heppenheimer. You should be forewarned (sic) that you will receive (sic) a veritable ton of mail from offended readers. Comparisons with *Playboy* and *Hustler* will probably abound.

Mark Wolfgang
Mason, WI

HARRISON'S ENERGY CRISIS

...Apparently Harry Harrison's "sharp sense of science" was a little dull the day he cobbled together his ludicrous article in FUTURE LIFE #15. Or perhaps it was his "keen sense of humor" that was malfunctioning.

The no-growth scenario that Mr. Harrison praises has long ago been proven to be antide-

mocratic and elitist. The rich are not going to give up their prerogatives, so that the only way to curtail growth is to deny others the chance to improve their lot. Resentment against usurpation of prerogatives by the lower classes is nothing new. Barbara Tuchman pointed out examples of it as long ago as the 14th century and I am certain it occurred long before that.

However, it is when Mr. Harrison contends that nuclear power is "unreliable, costly, dangerous, polluting and poisonous to the world for thousands of years to come" that his keen sense of humor plays him for a fool. Dr. Edward Teller's book *Energy From Heaven and Earth* shows how silly Mr. Harrison's contention is. I hope that your readers will read Dr. Teller's book for a more balanced and rational view of our energy problems and possible solutions.

Don Wilkins
Durham, NC

MOSLEMS IN SPACE

...If a Moslem must pray five times a day, facing Mecca each time he prays, how does he do this on a space colony rotating at 1 RPM?

Answer: Unless the space colony itself is "pointed" towards Mecca, Moslems will have to commute to weightless areas or become contortionists.

Since most plans call for colonies to face the sun, and since there are bound to be competing religions, this may prove to be a difficult problem.

Andrew Huegel
Rocky Point, NY

COVER-UP

...Many readers have of course noticed the big change in your cover design from issue #8 to #9. It was great. I was wondering if we can expect any changes in your logo design and your magazine after issue #16? I am sure that if you do make changes, I'm sure we'll enjoy them—so good luck to a magazine with a good future!

Jay Hannon
Laval, Que., Canada

Notice anything different about this issue's cover?

GETAWAY SPECIAL

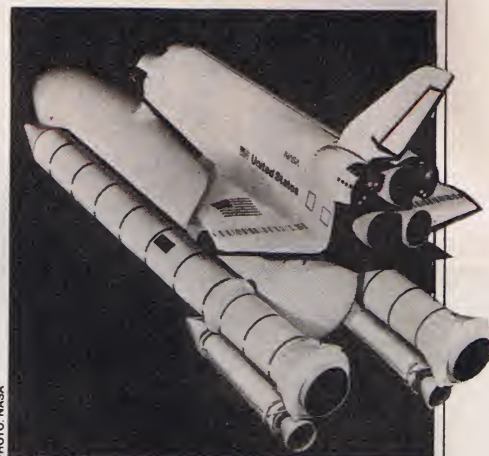


PHOTO: NASA

...I was one of the many people who entered the "Getaway Special" contest. I was wondering about the status of the contest. I have heard nothing about it. Is it still on? Did somebody win?

Nathan Shedroff
Los Altos Hills, CA

Yes, our Getaway Special contest is indeed still on. Because of the delays in the launching of the shuttle, we extended our contest deadline to July 20, 1980. At that time, the winner or winners will be chosen and announced.

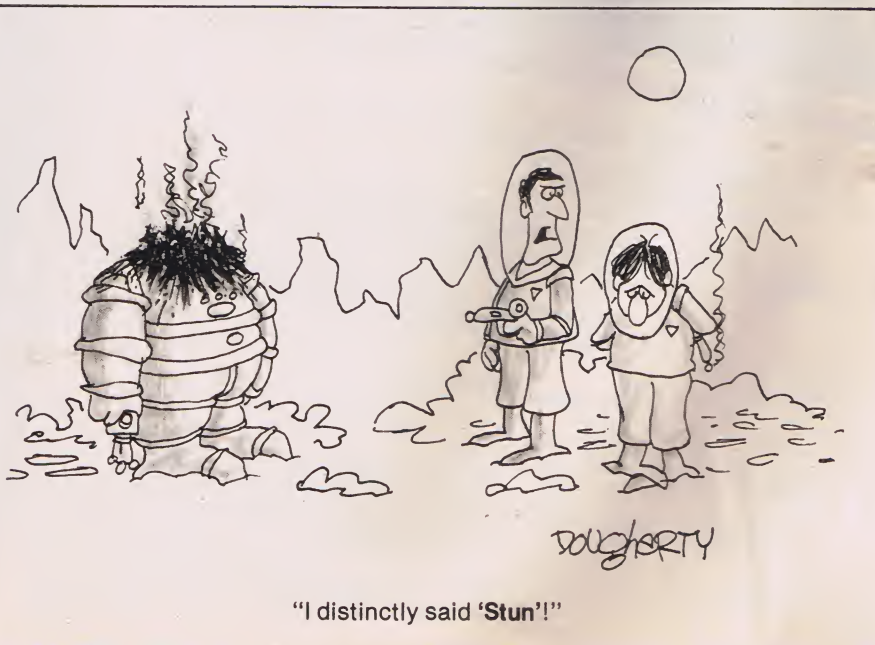
TOKYO KNOWS

...By chance I found a copy of FUTURE LIFE at a newsstand here in Tokyo. I decided to buy a copy. I am glad I did.

I didn't like all of your articles. But I read most of them. Perhaps that is a good indication that you have a good mix of articles.

I liked the "Star Empires" feature. There was nothing breathtaking about the article but it was a good summary of our present knowledge about the possibilities of future human, or non-human, developments.

As a history teacher at an international school



"I distinctly said 'Stun!'"

in Tokyo, I have tried to direct students' attention to the future as well as the past. Please pardon the cliché, but I think that we must learn from the past but never forget to look into the future.

I also admire the relatively simple prose you use. I know that anybody can oversimplify, but I think that is better than "obfuscation of the obvious with a torrent of unknowing erudition." (In other words, disguising your ignorance with a lot of words.)

Your space art is also good.

Dan Montgomery

Tokyo, Japan

MAKING SPACE HAPPEN

... Having read FUTURE LIFE magazine, I have reinforced a belief I came to many months ago. That is that there are not many *actual* space pioneering enthusiasts. By that I mean people who actually desire and believe in your magazine's speculations and are willing to do something about it.

It appears to me that the majority of people who write to you love to talk and dream about all the great things that man can accomplish, but either do not know or do not care about how to make this dream a reality. Nobody anywhere has bothered to make a substantial commitment outside of the few, such as the Hensons and your magazine.

I myself am guilty of unproductive dreaming in that I will talk about it, but never really do anything. I used to believe that I was only one person and could have no real effect (besides, the government or others will do it anyway).

Now, with the coming of the Careers in Space convention in late June (FL #15), an opportunity arises for persons who are interested in such to get together as one body and meet on the subject. The only problem is the same one which is present at all such events. People show up if they find it extremely convenient, and more or less "browse around." Nobody really wants to make a commitment to anything.

It is six months until the Careers in Space convention in late June in San Francisco, California. That is six months to prepare for travel expenses. Six months to prepare for vacation, or leave-of-absence time. Six months to pass the word around and in turn have it passed on again.

The major handicap that has hindered the citizens' program for space development has been that there has never been a major body assembled at one time and organized for positive results.

We have an opportunity to attend a convention that is not for science fiction, but science fact. What we, and you, can do is to boost the influence of our race into a frontier that, once started, will become increasingly difficult to stop.

There will be you and, hopefully, hundreds, perhaps thousands, like you. And hopefully there will be a varied group of guest speakers, from the speculators to groups such as the International Satellites Industries and the Earthport campaign. Maybe even a few of our government representatives.

The first step has to be taken sometime, by some body.

Why not all of us, together?

Mark S. Duncan

Salem, OR

LITTLE HOUSE IN SPACE

... I just read and reread Carolyn Henson's article "Choosing the Right Partner for the Future"

(FUTURE LIFE #15), and I must say that I was truly heartened that there are still people out there who believe in the family bond. My husband and I also married with the knowledge that we would be going into space—together. Our three children will be by our sides if we go while they are still living in our family unit. However, even if they are grown and married, I tend to think that they and their families will come too.

The space colonizers are of a special breed, as were our forefathers who colonized America. My husband and I are looking forward to being part of that group. I think that the majority of the population is looking toward the type of society that will result because of space colonization: the close-knit family, the close-knit neighborhood, and the good old-fashioned husband and wife team. (*Little House on the Prairie* is far too popular a show for this not to be true.) Thank you for a great article, Carolyn.

Sheree Zielke (Heintzman)

Thunder Bay 'P', Ont., Canada

ALIEN GAMS



PHOTO © 1979 PARAMOUNT

... "New Faces of the 23rd Century" (FUTURE LIFE #15) was a masterpiece! What else can I say, except that Persis Khambatta has great legs!

Mitchell Craig
Lancaster, SC

FEMINISM AND SCI-FI

... I have been prompted to write in response to the letter of John Clifton in FUTURE LIFE #15. Briefly, Mr. Clifton is of the opinion that the casting of Sigourney Weaver as the lead role in *Alien* does not indicate a general upswing in public taste, but a kind of "reverse chauvinism." It occurs to me that the matter at issue here is not the particular merits of that specific movie, but a question of sexual equality in general. For a literary medium known for its open-minded acceptance of new concepts and ideas, science fiction has traditionally cast women in roles that are

nothing short of barbaric. How many major sci-fi novels can you name in which the main character is a woman? How many great novels in *any* literary medium have featured a woman as their major shaping force? How many great female heroines can you name? Maybe you get my point if the only two which spring to mind are Wonder Woman and Little Annie Fannie!

Allow me to quote a woman, and a major science fiction writer in her own right, Ursula Le Guin:

"One of the great early socialists said that the status of women in society was a pretty reliable index of the degree of civilization of that society. If this is true, then the very low status of women in science fiction should make us ponder about whether we are civilized at all."

For the other side of the coin, Theodore Sturgeon:

"A dear friend of mine, herself a writer, once said: 'In order to achieve the same literary status as a man, a woman must work twice as hard, and write twice as well. Fortunately,' she said, 'that is not difficult!'"

In his letter, Mr. Clifton states that: "Crying men and 'raised consciousness' sells..." In order to refute that rather ludicrous statement, let us, for one moment, consider the issue in the same light in which Mr. Clifton examines it; purely economical. One of the basic premises of economics states that it is impossible to sell a thing unless there is a "market" or a need for that thing. The mere fact that 20th Century-Fox felt secure enough to sell *Alien* on the basis of a strong

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female lead does, in itself, indicate that public taste is changing. If this is "exchanging one prejudice for another," then please slap the handcuffs on my wrist, officer.

Could it be, Mr. Clifton, that deep down, whether you realize it or not, you're just a bit of a chauvinist?

David Martin
Houston, TX

NATURE BUFF

... Just picked up #14. As usual, it's beautiful. I'd like to add to Brandon Key's letter. *To Fly* is also shown at the Chicago version of Marriot's Great America's Pictorium, identical in all respects save location.

Also, in Carolyn Henson's Alternate Space, she tells an extremely unfair anecdote about Wisconsin. Of course, we've got the usual amount of bad apples here, but such a scenario is unlikely. Believe me, I've absolutely nothing against space colonies, in fact it's my favorite subject, but I still like a little nature now and then. Space may be the place, but a forest is still a thing of beauty. I seems to me that Ms. Henderson expects all of Earth to be as flat and predictable as, say, Manhattan Island. I say, go ahead and climb into orbit, but don't step on a badger's, or anyone else's, feet while you're at it.

Daniel Hartung
Janesville, WI

BERKEY FAN

... The article on artist John Berkey (FUTURE LIFE #13) and the beautiful painting reproductions were very striking indeed. I wonder if you can possibly tell me if his original paintings are rendered in oil or acrylics. I save as many of his reproductions as I can and do want to know what they are done in.

Walter P. Morgan
Columbia, CA

John Berkey says he makes his own paints, and he describes them as "mixed media." He uses various binders, including casein, a glue made out of cheese, to which he adds the pigment. He says he started making his own paints about six years ago, mostly to control the drying time.

CLONE SENSE

... What is this nonsense of Van Vogt's about the "promise of immortality inherent in cloning...?" (Tomorrow, FUTURE LIFE #14) Asimov, in his "Clone, Clone of My Own" (*Fantasy & Science Fiction*, August 1979) does a pretty thorough job of debunking this notion. Did you know that the original Isaac Asimov died in 1959 and that the one we have now is the third? (The second one didn't exactly die, but it did stop working in 1973.)

William J. Denholm III
Mountain View, CA

COSMIC PETRI DISH

... I was amused by a comment you quoted by David Black of NASA Ames in FUTURE LIFE #14. He described the planets as "cosmic Petri dishes where life may evolve."

This is a very poor analogy. In the first place, life does not arise spontaneously in Petri dishes by a chance combination of organic material operating over billions of years. It is placed there by the deliberate act of an intelligent physician or laboratory technician for a specific purpose. Also, once a specimen has been placed on a dish it does

not "evolve," it simply spreads to fill the culture, reproducing according to a prearranged, built-in genetic code.

Come on, Mr. Black. It would seem that you are either imbibing creationist thinking or are an ill-informed evolutionist.

Terry L. Hulse
Fullerton, CA

LASER MAVEN

... I would like to take this opportunity to commend you on the great job you did on *Laserium* (FUTURE LIFE #14). FUTURE LIFE is an excellent publication and I found all the articles to be informative and provocative. On behalf of Ivan Dryer, "the D. W. Griffith of multi-media," I thank you.

Ned Madden
Laser Images, Inc.
Van Nuys, CA

LASERIUM OMISSION

... I noticed that in your article on *Laserium* your list of presentations was incomplete. You made no mention of the new rock music presentation, "*Laserium — Light Years*." I found this article, along with the rest of the magazine, very interesting. Keep up the good work!

Derrick Hachtel
Denver, CO

FUTURE PRIORITIES

... Congratulations to Mr. O'Quinn for his very perceptive editorial in FUTURE LIFE #14. I was very impressed with his clear and concise analysis of America's dilemma. Permit me to share some of my feelings on that subject.

I see the whole problem as a situation in which America has responded to crises in an unimaginative fashion, and has failed to develop any worthwhile goals for us to pursue. America needs to set major economic, social, technological goals and a commitment to the fact that man is ready to leave his birthplace on Earth and venture into his new environment in space.

As executive director of the Priority Council of America, I have spent considerable effort in trying to define what our national and international goals and priorities are. The president and Congress are continuously preoccupied with the task of dealing with problems as they occur, and therefore don't seem to be able to give us much leadership for the future.

I have surveyed various institutions that develop new options and serve as consultants to business and government. They all have some very promising ideas as to what could be done to make our future a better one, but these are still only individual efforts that don't give a coherent concept of what should be done.

Many futurists feel that the doomsayers can be proven wrong if we allow the more imaginative and creative people to lead the way out of the current situation.

Andrew Weiszmann
World Future Society/Chicago Chapter
Chicago, IL

BOOBY COMES OUT OF SHELL

... This is one booby who would like to answer some of the points raised in Russell Bates' letter in FUTURE LIFE #14.

Russell, you block development of nuclear power plants and then gripe because they only provide 15 percent of our energy needs. (Only 15 percent? That is an awful lot of energy!)

Point two: You ask, where would the energy and financing come from for space colonies? From people who want to make money. Money in space with power plants, metallurgy, pharmaceuticals, communications, electronics, R&D, etc. The materials would initially come from Earth, then Luna, then asteroids would be hauled into near-Earth space and mined using solar, fission and fusion energy.

Why should cities in space be less dirty than their terrestrial counterparts? Because in a colony, where everything that is brought in from outside costs energy to get it there, you damn well better recycle those beer cans and foodpack wrappers in-



"Prince, what's the problem boy?"

stead of trucking more up from a gravity well. Also, the limited air supply would be more sensitive to pollutants than the Earth's atmosphere, so it would be more carefully monitored and tended.

And finally, when we are permanently established in space for all time, then you can say that we are ahead in the space effort. The Russians have the lead in space colonization and endurance. We aren't even close.

If people expressing hope and optimism in the future of humankind in the universe are boobies, then a booby I am, and a booby I'll stay, and damn proud of it.

Stanley M. Hollinshead
Atlanta, GA

WORLD WAR THREE

... In your In Print section of FUTURE LIFE #14 you reviewed the book *The Third World War*. Though in general the review was correct I think you missed the most important points.

It is a call for military preparedness no doubt, but it's not just a call for more bucks for bigger bangs. By and large the general public and probably most of your staff have little or no knowledge of the actual decline in military strength of the Western nations in relation to the Soviet Union. Or why the Soviet Union needs such tremendous power. Why they spend twice as much of a percentage of their GNP on the armed forces (Warsaw Pact included) as the West does. Why do they need a fleet rivaling ours in a landlocked country that is primarily self-sufficient? Why do they have the most powerful army in the world supported by 50,000 tanks? Or an air and strategic force second to none, which provides a shield for whatever their conventional forces may do?

The point of this book is not just a call for alarm, it is asking us to think about these matters and just not assume they'll never happen. Like all good sci-fi, it asks us to question and to find out and that means not just using the *New York Times* as a source or the pap that Senator Kennedy or President Carter hands out. This book asks us to think on a matter that involves the survival of our wide and varied style of life, and the information is available to all, just go to your local library or book store.

One final note. In 1945 the Western powers had the weapon and delivery system that would have wiped out their system of life forever. We didn't. If the roles had been reversed, could we say the same about them?

Robert Williams
Mount Prospect, IL

GAY SCIENCE FICTION

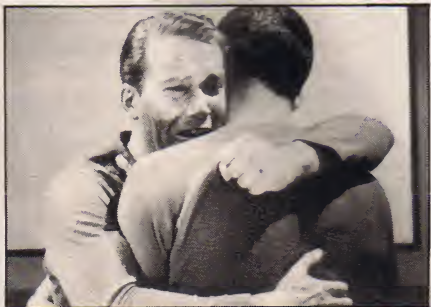


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... In SF movies depicting Earth people in the future, I find one major inaccuracy dealing with the type of relationships the characters have with each other; simply, they are all heterosexual rela-

tionships. If there are any gay relationships in all these new SF movies they certainly must hide them very well.

It's obvious that, with people now standing up for gay rights and gradually winning them, homosexuality will become very common in the future, especially as the young generation today is very much more broadminded than the past few generations. So if gay relationships are obviously going to be much more common and open in the future, don't we have a right to be represented in the SF movies? We don't want to stick out a mile, but we should be there just like any other normal characters, because we are ordinary people and we will be a lot more common in the future.

For those who don't agree with me, look what black people had to go through before people accepted them as ordinary people, and still there are some who don't. If black people can make it into

SF, so can gays, because we *are* people, despite what some others may think!

Andy Guthrie
Whgalla, South Australia

TREK PIX

... I would like to mention that your three-page storyboard article on *Star Trek — The Motion Picture* in FUTURE LIFE #14 was truly exciting. My liking for *Star Trek* has existed since the first episode was ever aired. I am really looking forward to the movie.

Chris Gaynor
Arlington, VA

ART BOOKS

... In FUTURE LIFE #10, in the Gallery and Portfolio departments you did presentations on the

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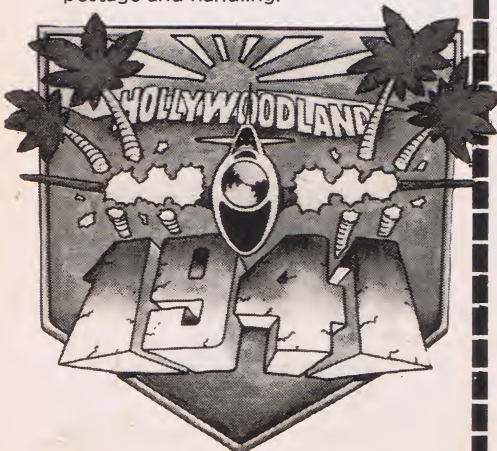
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input

artists Don Davis and Syd Mead, respectively. In each article, it was stated that each would have books of his published later this year. Have said books been published?

William Johnson
Peterman, AL

Don Davis' book is still in the works, but Syd Mead's Sentinel was recently published by Dragon's Dream and should be in your bookstores this spring.

YOUTH OPINION

... The following is an open letter to Senator Proxmire on an issue which I believe concerns your readers very much!

Senator Proxmire,

I am a college student from Michigan, spending my time trying to become a teacher—from Michigan. I suppose that, by the letter of the law, I am not one of your constituents, but it has been hard for me to understand how, in such a small world, we can all be anything but—constituents—of each other. You have the ability to profoundly affect my future, and young men are traditionally concerned with the future. Teachers are professionally so concerned. As a member of both these—minorities—I am very much aware of the problems that young people, the inheritors of the future, have always had.

Our worst problem, although very simple, is eternal and unchangeable. It is that we suddenly become aware of ourselves, look around, and discover that the rest of humanity has been busy shaping the world for thousands of years, without even waiting to ask our opinion on how it ought to be done.

We agree to the world on those terms—if we must—but young people do have a long history of leaving, whenever they can, to start a New World of their own, to try and do it a little better. We crossed the sea to a New World four hundred years ago, and made the Americas. We kept going west, across the plains, as long as there were wild places, empty places, where we could make a fresh start. We're really not revolutionaries you know, not at heart. We're explorers and settlers by preference. It's only when we find we must stay in the Old World, with all its old problems, that we decide we must try to change it. And that is never, never easy. The problems of a civilization five thousand years old have a way of becoming very tangled and tough and knotty, very fast. In fact, it often happens that the best way of attacking those Old World problems is to simply—find a New World.

And there is a New World, though it is not the one that can be seen looking west, or east, or north, or south. My generation was born when the people of this Old World had, for the first time, looked up, into Space. We have been doing it ever since. We have looked at the Moon and the planets as places where men can walk, and now that we have left the grade-schools, and now that we are leaving the colleges, we begin to see them as places where men and women—might—live.

Let us do it, Senator. Let the generation of Americans who were born with the flights of Sputnik and John Glenn be the ones who give meaning "for all mankind" to the Space Race that we grew up with. Let us go.

For all our sakes, let us go.

Michael J. Goulish
River Junction, MI

database

TRANSPORTATION

MOVING L.A. PEOPLE INTO THE FUTURE

Los Angeles, which is known in some circles as the "pollution capital of the western world" (or at least of the western United States), may soon be trying out a partial solution to its problems in the form of a "People Mover"—a sleek, elevated mass transit system.

This new type of transportation can be considered a test-case for what is also known as the personal rapid transit system. While it is certainly not a new idea—for example, Disney has had People Movers at both its amusement parks for years—problems had reportedly developed with the facilities being used at Dallas-Fort Worth International Airport and in Morgantown, West Virginia; and so the project was, for the most part, shelved. But now, backers of the new system say that recent developments in technology have made the People Mover eminently practical and safe.

Running along a track about two stories above street level, the Los Angeles People Mover will operate by electricity, automatically, somewhat like a horizontally moving elevator. Each car will hold from 20 to 100 passengers, and will either travel separately or linked together in a train. According to the Los Angeles Community Redevelopment Agency, at peak hours the system is expected to carry some 9,000 commuters an hour,



PHOTO: LOS ANGELES COMMUNITY REDEVELOPMENT AGENCY

The futuristic "People Mover" may be transporting Los Angelenos as early as the summer of 1983.

at a fare of 25¢ each. They will be able to board or disembark at 13 stations along a 2.9 mile route that will take in a large part of commercial Los Angeles.

Thus, by the summer of 1983 (if

things go smoothly), Los Angelenos should have their very own pollution-free public transportation system to boast about—at a total cost of about \$175 million. Whether L.A.'s People Mover will prove to be the

mass transit service of the future, or whether it will become the west coast equivalent of New York's besieged subway system, only time (and the commuters) will tell.

—Barbara Krasnoff

REAL REEL UFOS

ALIENS AMONG US

Move over Steven Spielberg... the next close encounter to be seen on the silver screen will be a factual one. At least, that's what producers Marianne and Brandon Chase are saying about their upcoming release *UFOs Are Real*; a subtly titled documentary that "proves" the existence of flying saucers. According to the filmmakers, "It will carefully document and prove beyond a reasonable doubt to any person interested in the truth, that UFOs are not only a

real physical phenomenon, but that some UFOs are extraterrestrial space craft."

The movie plans to back up its claim in four ways: offering photographic evidence (is it real or is it a pie plate?), interviews with actual witnesses (including abductees), scientific research which backs up UFO reports and evidence concerning a "cosmic Watergate" cover-up of saucer sightings by the U.S. government.

One of the film's real-life stars, Dr. Bruce Maccabee, allegedly invoked the Freedom of Information Act to get his facts. The filmmakers state that his actions forced "the FBI to

hand over a secret 1,000 page file on their UFO investigations. In this file, which the FBI had previously stated never existed, Maccabee discovered some interesting documents." Included in his findings were statements saying that the UFO phenomenon was "something real and not visionary or fictitious."

The movie also offers statements by such well known celebrities as J. Edgar Hoover, Col. Gordon Cooper, Senator Barry Goldwater and President Jimmy Carter to support the UFO cause. According to the producers, the movie dishes up quite a few scientific insights, including the statement that "there are probably

millions of planets in the universe capable of supporting intelligent life." (Who said investigative journalism was a thing of the past?)

The Chases also state that "a recent poll of scientists shows that most of them believe that UFOs are truly real!" In their eyes, *UFOs Are Real* is a film "with far reaching consequences, and with such breathtaking and thought-provoking evidence, that it cannot be ignored by even the most hardened skeptic."

Bigfoot, the Loch Ness Monster and the governor of Atlantis, the lost continent, were not available for comment.

—Josephine Weiner



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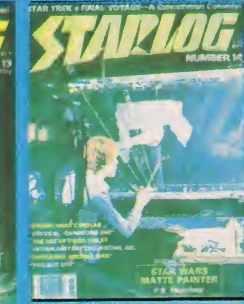
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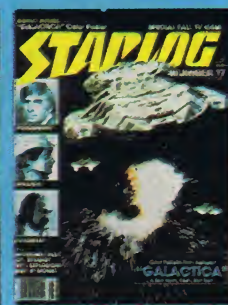
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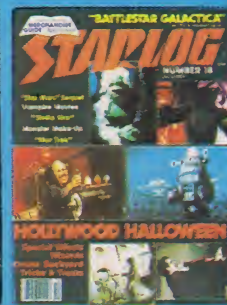
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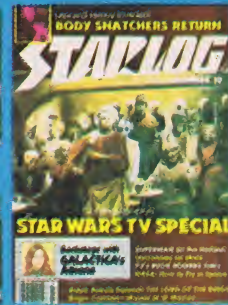
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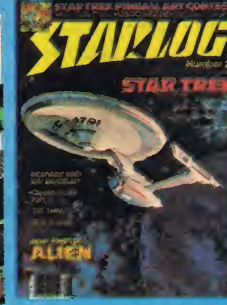
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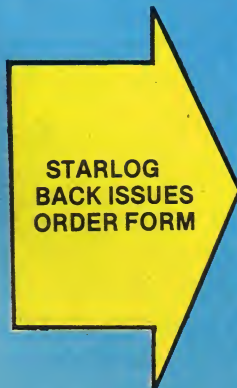
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NOT NASA

DUMB ROCKET FOR SPACE ENTERPRISES

America's official space program has all its eggs in the space shuttle basket for the moment. But while NASA struggles to launch its oft-delayed spaceplane, non-governmental competition is brewing.

For instance, the "Big Dumb Booster" pictured here. No, it's not a startling advance in aerospace technology; in fact, it's simply a cut-rate version of time-tested rocketry. And because it doesn't require forging any new engineering frontiers, this simpleminded rocket could ship cargo and freight to space at prices NASA cannot hope to undercut.

The Big Dumb Booster (officially known as the Commercial Large Launch Vehicle) is just one of about two dozen rocket concepts which have been studied by a non-profit organization called Foundation, Inc. Led by enterprising engineer Gary Hudson, the group is seriously looking into space transportation alternatives. Why? Because they believe their dreams of space commercialization will be stalled until low-cost space transportation is available.

"I don't see low-cost space transportation being addressed by NASA," says Hudson. "The shuttle will be no more inexpensive than existing expendable vehicles. NASA tried to build a national spaceship to satisfy all needs, but that's just not possible."

Hudson outlines the cost-saving virtues of the Big Dumb Booster: "It's meant to act as a freighter, not a manned craft. It's as wide as the shuttle cargo bay, 15 feet in diameter, and 120 feet long. It could deliver from 10,000 to 150,000 pounds of cargo to

orbit. The initial cost per pound would be \$50, with the price dropping eventually to \$16. The tanks are expendable, but the rocket engines could be recovered downrange or in orbit. We would also save money by using an expendable launch pad—a converted truck bed. The whole idea is that development cost, including manufacturing, will cost less than \$40 million." When you're talking spacecraft, that's peanuts.

Sounds good in theory, but Hudson doesn't have a launch date set. "I will say that it will probably happen sooner than you think," he ventures. "Once the money is put up, you'll see a private launch within 24 to 36 months."

When he organized the Foundation in 1971, Gary Hudson did so with the intent of being the organization that would provide low cost transportation to space. Now he sees the Foundation's function in a different light. He publishes a monthly newsletter, *Commercial Space Report*, which serves as a forum for entrepreneurial ideas about space ventures.

"We all tend to be libertarians," he says of his Foundation cohorts, "and I see my function as to bring together people of like-minded philosophy to give them the opportunity to develop technology-limited futures, as opposed to futures limited by economics or politics."

Hudson believes the major justifiable need for going into space, other than military, is the need to create new wealth and exploit the resources of the solar system. "If you have an affluent world, you have less chance of conflict," he observes.

His favorite outer-space money-making scheme involves capturing asteroids and exporting their valuable mineral resources to Earth-based consumers. He's a particular admirer of



Artist's concept of the Big Dumb Booster.

science fiction writer Poul Anderson's concept of a Polesotechnic League. "It's a league of interstellar space merchants," he explains. "If I had a choice about how the future in space should be, that's

the way I'd go. Free trade zones in space, a free and wild solar system.

"And of course," Hudson adds significantly, "the only thing that's going to make that happen is low-cost transportation." —Robin Snelson

FUTURE DREAM

HIGH PRICED FANTASY

The emphasis in filmmaking these days, especially in the science fiction and fantasy genre, seems to be on two things: high class special effects and equally high class prices. The latest entry in the "most costly film ever produced" category is a recently announced adaptation of Roger Zelazny's novel *Lord of Light*.

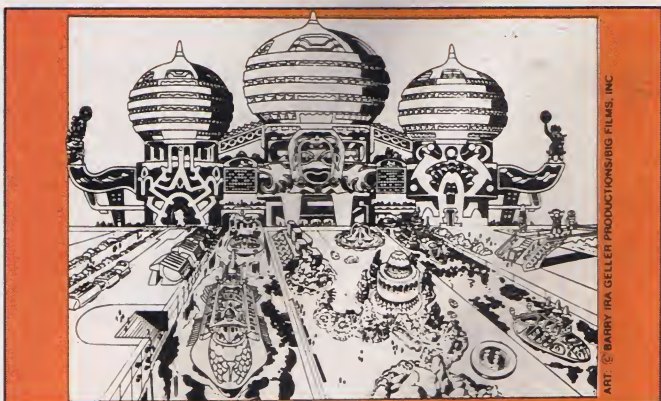
According to Barry Ira Geller, who is both producing the film and adapting the 1967 Hugo winning tale, the story concerns a revolt against a superhuman civilization which has taken over the technology of another planet. Naturally, the whole scenario culminates in a huge battle. The exteriors for this extraordinary motion picture are being designed by cartoonist Jack Kirby, of Marvel Comics fame. Projected costs have been

estimated to exceed \$50 million.

That doesn't worry Geller. He has obtained an irrevocable letter of credit from the Royal Bank of Canada for the princely sum of \$400 million. With these funds, he is investing in a 10,000-acre industrial park called Science City. The income from Science City will finance *Lord of Light*.

But the story doesn't stop there. Geller and his supervising producer, Jerry Shafer, are planning to follow the film with a 1,000-acre amusement park tentatively titled Science Fiction Land. This \$400 million theme park will be erected from the basic sets used in *Lord of Light* and, according to Shafer, will be three times the size of Disneyland. They have taken out a lease on a stretch of land about 13 miles east of Denver, Colorado.

It should be another year before actual work on the motion picture



begins. Meanwhile, Geller and Shafer have a great deal to do, both in dealing with plans for their project and with public skepticism concerning their success. However, in a recent interview, Shafer said that he wasn't worried about the eventual popularity

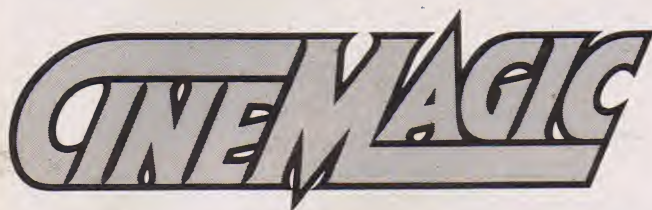
of either the film or the theme park, since American interest in movies is so high. "If Cecil B. DeMille left the *Cleopatra* sets behind," Shafer asserted, "that would be worth millions today."

—Barbara Krasnoff

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CELLULOID SPACINESS

MARS AU GO GO, SPIELBERG, LUCAS AND PAL HEADED FOR THE SCREEN

Far from waning in popularity, the science fiction/futurism boom seems to be gearing up for a second wave of big budgeted box office bonanzas. Record producer Jeff Wayne has announced plans to film a musical version of H.G. Wells' *War of the Worlds* for Paramount Pictures, the company responsible for George Pal's classic 1950s version. Wayne was the producer and creator of a long playing musical based on the science fiction novel released two years ago on Columbia Records. . . George Pal, meanwhile, is finally launching his *Voyage of the Berg*—an epic tale of iceberg towing to be lensed by American International. Robert Bloch has been tapped to handle screenwriting chores. Pal has been working on this project for nearly three years. . . Steven Spielberg is mounting a double-pronged attack on moviegoers within the SF genre. His re-edited version of *Close Encounters of the Third Kind* will be re-released by Columbia later this year.



H. G. Wells' gigantic Martian machines may once again ravage Earth in yet another version of his *War of the Worlds*. Only this time, Paramount and record producer Jeff Wayne are making it into a musical.

Paramount Pictures is also working with both Spielberg and George Lucas on a \$40 million project entitled *Raiders of the Lost Arc*. Lucas will produce and Spielberg will direct. No announcement has been made regarding pre-production activity. . . United Artists will be releasing *The Final Countdown* this summer. Starring Kirk Douglas, Martin Sheen, Katharine Ross, Charles Durning and James Farentino, the movie concerns the adventures of a crew aboard a

modern day nuclear submarine. The submarine enters a strange mist and, when it emerges, finds itself off the coast of Pearl Harbor in the year 1941. . . Director Ken Russell has completed work on Paddy Chayefsky's *Altered States*, the story of a scientist who physically regresses as the result of a series of experiments on human evolution. Chayefsky, who wrote both the novel and the screenplay, is reportedly so miffed at the finished film that he wants his

name taken off the titles. The film is sure to be controversial. When the producers approached scientist John Lilly about working with them on the project (the film's protagonist makes much use out of water-filled sensory deprivation chambers, at one time a mainstay of Lilly's research), the noted scientist demurred, stating that the film's premise "sounded like a cross between *Dr. Jekyll and Mr. Hyde* and *King Kong*." So much for progress. —Charles Bogle

TOMORROW'S TV

CANADIAN SF SERIES IN THE WORKS

In *FUTURE LIFE* #16, the Video Images column mentioned *The Tomorrow Man*, an ambitious television pilot for a proposed series entitled *Through The Eyes of Tomorrow*. While the fate of this proposed anthology is still uncertain, creators

Stephen Markle and Tibor Tokacs have come up with the story lines for the initial season. Initial installments of the *Twilight Zone*-ish show will include "The Man Who Cried Alien!" (an astronomer is given heightened paranormal powers by extraterrestrials), "The Everlasting" (two newlyweds discover a 400-year-old horror beneath their honeymoon cottage), "Terror At The Edge of Time" (13 astronauts are marooned on a lifeless world, the tenth planet

Chiron), "No Place Like Paradise" (in a post-holocaust world, two survivors are helped by a beneficial computer), "Tell Her She's Missing" (detective Harry Zero is an antique even in the 1940s and his latest case takes him out of this world), "The Nightmare Ward" (a project dedicated to eradicating sleep from the human condition creates a small brood of ever-awake, increasingly aware patients) and "Time and Time Again" (27 Evermore Drive houses a group of time travelers from the year 2013 who must change the course of 1985's history in order to save their future). *Through The Eyes of Tomorrow* is a project proposed by Norfolk Communications. —John Hoxley

According to Dr. Robert Forward, a senior scientist at the Hughes Research Laboratories in California, antimatter-powered rockets will open space to rapid and efficient travel, eventually taking us to the stars.

Speaking before an annual propulsion conference for space experts, Dr. Forward listed the ramifications of antimatter-powered flight by stating "...the Moon in a day, Mars in a week, Pluto in a month, and the stars in 50 years travel time.

"A gram of antimatter may not sound like very much," stated the research scientist, "but it only takes a tenth of a gram to send a 10-ton payload to the Moon in less than a day. Ten grams will send the same payload to Mars in less than a week."

One problem exists with antimatter. How do you hold on to it once you've got it? Theorizing the difficult task, Dr. Forward recommends a magnetic trap, which is useful in terms of minimum loss of antimatter. This technique works best in space where there is no gravity.

"The design of rocket engines that can handle such high energy fuel is still ahead of us," Forward concluded. "But when developed, antimatter propulsion will lead to exploration and utilization of the resources of the solar system. Eventually such fuel will make it possible to explore the nearby stars." —Leonard David



Don Francks (left) plays an unscrupulous prison warden, and Stephen Markle (right) is his victim in *The Tomorrow Man*.



DRIVING AMBITION

ANTIMATTER STREAM = SPACE SUPERHIGHWAY?

Travel from Earth to the Moon in one day? The recent discovery by scientists at New Mexico State University of a stream of antimatter from interstellar space increases the chance of developing antimatter fueled rockets to explore the solar system and nearby stars.

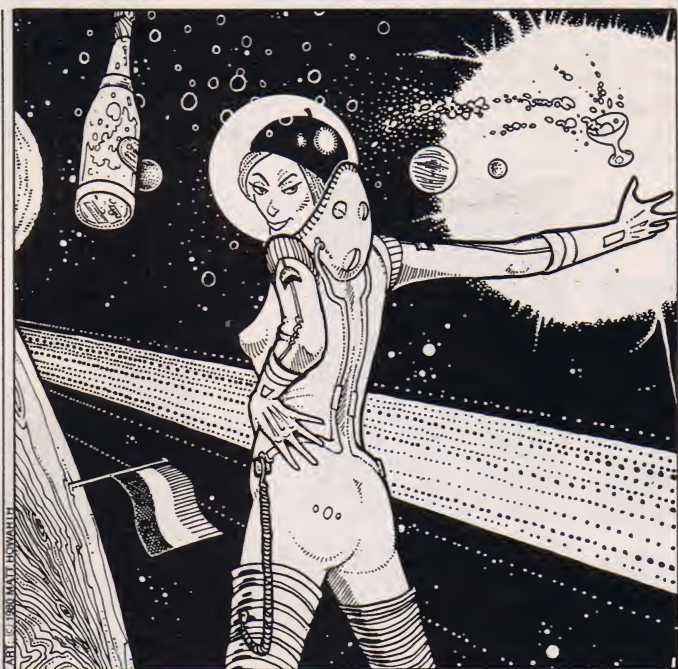
FRENCH FLIES

BONJOUR HERMES— FRENCH SPACE SHUTTLE

Make way for a new entry in the space shuttle look-a-like contest—the Hermes. The French aerospace firm Aerospatiale is studying plans to beef up the European Space Agency's (ESA) Ariane booster to propel a "mini-shuttle," perhaps carrying five astronauts into low Earth orbit.

The Hermes is one of several growth options advocated by France's space agency, the Centre Nationale d'Etudes Spatiales (CNES).

To date, the basic Ariane vehicle has yet to be test flown, and is now under the jurisdiction of ESA. The CNES, however, is pressing for a commercially oriented use of the space booster, outlining an ambitious schedule to upgrade the rocket during the 1980s to 1990s.



According to Hubert Curien, President of the CNES, the Hermes hypersonic glider could allow several changes in orbit, "making it suitable for servicing manned orbital stations."

Although the abilities of a Hermes have yet to be fully assessed, the space plane might be constructed to carry one and a half tons of freight, piloted by just two astronauts. The Aerospatiale group is also studying an unmanned materials processing space facility labeled Minos.

In addition, France's space agenda for the future may include a touch of cosmic detente with the Soviet Union. The French, who occupy the leading position in cooperative space ventures with the Soviets, have been invited to supply an astronaut and, together with a U.S.S.R. cosmonaut, treated to a 1982 hop onboard a Soviet Soyuz spacecraft. It is rumored that the French are considering a woman for the assignment. *Vive la difference.*

—Leonard David

NETWORK NUTS AND BOLTS

BEYOND WESTWORLD: TV'S NEW LOOSE COG

CBS-TV is planning to unleash a horde of out-of-whack robots upon the viewing public this year with a new series entitled *Beyond Westworld*, a mid-season series produced by Lou Shaw Productions in association with MGM-TV. Six episodes of the show have been ordered by the network, which describes *Beyond Westworld* as an offshoot of Michael Crichton's *Westworld* motion picture and not a sequel.

"In the *Westworld* feature," explains executive producer Lou Shaw, "the robots had minds of their own. They revolted and slaughtered everyone at the Delos amusement park. In my pilot episode, the robots

revolt, but not on their own. The man who first created them, Simon Quaid (James Wainwright), reprograms them and, at his orders, they kill everyone at Westworld."

Shaw, who wrote the series' initial installment, describes creator Quaid as a somewhat sympathetic character. "The man's been greatly offended by the people at Delos because, as Quaid says, 'They took my invention, my creation that could have served the highest needs of mankind, and made them into toys.'"

In *Beyond Westworld*, Quaid uses his flawless robots as a power base and schemes to take control of a nuclear-powered submarine. Undetected far below the waves, Quaid could conceivably become the third greatest power on Earth.

"The best of science fiction," continues Shaw, "generally handles contemporary problems and throws them into the future. There, they have a

better chance of solving the problems. That was always the great appeal of westerns, too. It was the only genre in which you could do honest stories. You could say who the real heavy was. It was the railroad boss. It was the banker."

In *Beyond Westworld*, Shaw's heavy will, each week, be pursued by relentless John Moore (Jim McMullen), the chief of security employed by Delos Corporation, the company that owns Westworld. Moore's job on the show will not be an easy one, according to the ex-

ecutive producer.

"The robots are made so beautifully, so brilliantly, that it will be very hard for Moore to beat them each week. One of the key lines in the pilot episode is: 'Let's face it, it's your wits against his machines.'"

"Although it's science fiction, the feeling of it is one of great credibility when you look at the role of robots in today's world. This all could happen a day or two from now. So, we're not planning anything in the show to be futuristic at all. It's all happening today."

—Susan Adamo

BEYOND MUZAK

SPACEY SYNTHESIZERS (AGAIN)

Always attempting to keep up with tomorrow's trends, FUTURE LIFE dutifully reports the existence of a Hollywood, California outfit calling itself "Future Rock"; a pop rock outfit publicizing the farthest out performers around. This month's Rock headliner is silver-clad Gaea, a European synthesizer whiz who appears on stage with a mountain of keyboards while singing such provocative songs as "Future Universe" ("beyond the stars and moons of Jupiter... (is) a place for us in the universe"). What's a typical Gaea performance like? Well, according to a press release from Future Rock, when the music starts, things get pretty spacey: "People are now dancing, moving to the beat, some are intently listening, strobe lights are



PHOTO © 1979 GAEA

distracting, sounds and textures completely new to the human ear are demanding attention. She is a driving force, subtle yet dominating our thoughts, from the beginning of the set to the end. I am wondering where she is from, could she be from another world?"

Only if you consider Germany out of this world, guys. Next month: The Bionic Dog Meets Kraftwerk.

—Ed Naha



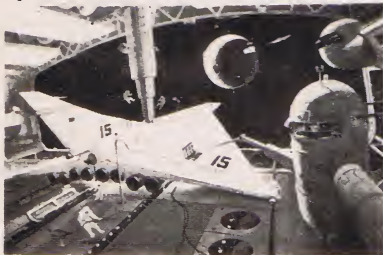
Jim McMullen makes note of an example of robot cleavage.

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The science-fiction explosion has affected the poster and print field too. More SF related wall hangings are on the market than ever. STARLOG PRESS is making available, on a limited basis, exclusive space art and science-fiction posters/prints. This selection of highest-quality artwork is not available through any other source.

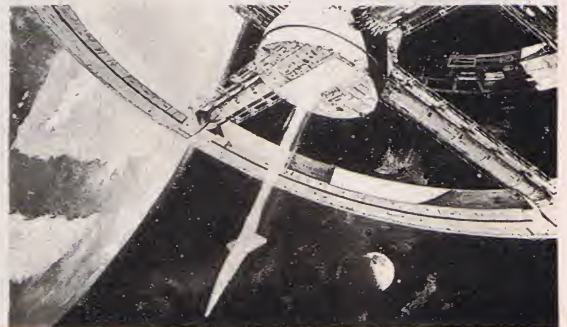
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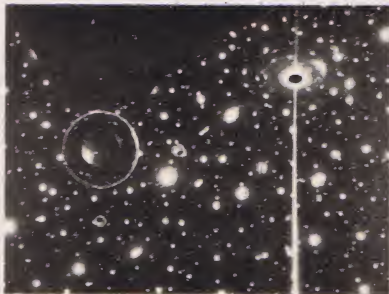
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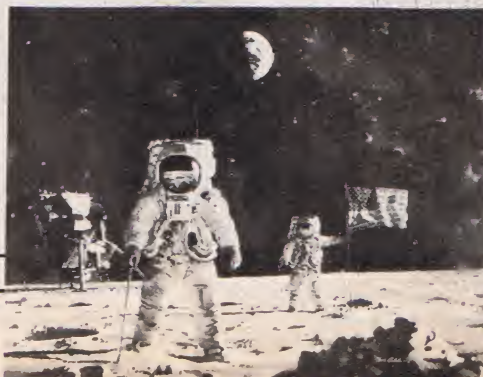


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WORKING IN THE 21ST CENTURY

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(New York Times Databank, April 1, 2030)

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Advancing technology, changing lifestyles and shifting values will change our concept of 'work' in the future.

By LUCY TEMERLIN

If you think those 21st century job opportunities sound far out, just keep in mind that the writer's imagination is limited by living in the present. The changes the world will undergo in the next 50 to 100 years are likely to be so vast that these classified ads from the year 2030 will soon seem hopelessly outdated. It's a sure bet that work we can't even imagine today will need to be done in the coming century.

Totally new kinds of jobs created by advancing technology are only part of the pic-



ture. Your workday in the 21st century will, without doubt, be as different from a typical workday in 1980 as today's workday is from its 19th century counterpart. One hundred years ago, most people worked 16-hour days just to earn enough for survival. Changing careers in mid-life was unthinkable; if you started out as a shoemaker, you retired or died as a shoemaker. By contrast, Americans today spend as much as one-third of their income on leisure pursuits, and increasingly embark on second or third careers in search of more fulfillment on the job.

What will make the 21st century workday different from today's? The combination of a variety of factors: longer, healthier life-spans; widespread influence of computerization; growing demands for more leisure time; more intelligent use of energy sources, and inevitable changes in societal values and lifestyles.

Some of America's leading authorities from a broad spectrum of fields recently took a long look at the shape of work patterns to come at a symposium called "Working in the 21st Century," co-sponsored by the Colgate Darden School of Business and the Wharton School of Finance, and funded by Phillip Morris Inc. While their predictions didn't always mesh, all the experts agreed on one thing—work will undergo some radical shifts by the next century.

Noting the present-day worker's growing expectation of satisfaction on the job, Princeton sociology professor Suzanne Keller sees more job rewards on the horizon. "We are witnessing a change in the incentive and reward system—the expectations of what

work should mean in one's life. In the future, there will have to be less *stick* and more *carrot*. There is a growing chorus of demands for more meaningful work."

Pollster Louis Harris senses the same mood. "We are experiencing a new era where the human dimension will be most critical.

Asimov: "I foresee a future in which every human being can learn, study in his own house or place of residence at any time he wants to, at any age. All knowledge will be available to him and he can study anything he wants."

Less than a quarter of a century away from the year 2000, people are already far more concerned with the quality of the human experience, and far less with the unlimited acquisition of more physical goods and products." Harris believes this shift will lead to the rapid expansion of the service trades, as

opposed to manufacturing operations. "In a world short of raw materials, it is not hard to predict that employment by the turn of the century will be 80 to 85 percent in the service trades."

One booming industry that does not consume too many scarce raw materials is the knowledge industry. Futurist/science fiction author Isaac Asimov envisions a tomorrow wherein our full exploitation of computer and communications technologies will lead to life-long education. "I foresee a future in which every human being can learn, study in his own house or place of residence at any time he wants to, at any age. All knowledge will be available to him and he can study anything he wants."

Indeed, the growth of the knowledge industry will create a wealth of new employment opportunities. "The great increase will be in 'knowledge jobs,'" predicts Citibank executive George J. Vojta. "In another ten years, they are likely to account for one-third of all jobs, and most new jobs."

New knowledge will be a valuable commodity in a rapidly changing future. Jack Behrman, business administration professor, adds, "Greater attention needs to be given to continuing education—as distinct from the practice of terminating education before the student has a chance to experiment with what he has learned."

Since future employment will shift to service, professional and technical jobs, life-long learning will necessarily be the norm. "People will probably work two, three or four careers during their lifetime," says William Bonnet of the Sun Company, "and



they will be returning to school several times for training in a totally new field—at ages as late as 60 or 70.”

With medical advances allowing people to live longer and healthier lives, the very concept of retirement will probably have to be rethought. “Perhaps retirement will not be a discontinuous event,” suggests Theodore J. Gordon, president of The Future Group, “but a phasing out of working life into retired life, working part-time as retirement age nears, or perhaps even working in non-remunerative jobs in the interest of society.”

Mandatory retirement is already considered a cruel sentence by many senior citizens, and the ratio of retired to active workers is presently approaching the danger point in terms of the workability of the social security system. Labor union official William Lucy cites worrisome statistics: “In 1975 there were 18.9 retired workers for every 100 active workers. In the year 2030, there will be 33.6 retired people for every 100 active workers. A demographic shift of that magnitude would have huge social implications.”

On the other hand, Isaac Asimov sees us developing a civilization in which “older people grow in numbers, power, capability and creativity.”

Other demographic shifts, already becoming evident, will significantly transform the work force, work schedules and workplaces of the future. Former *New York Times* labor editor A.H. Raskin sees improvements coming for women workers. “In the next two decades,” he predicts, “women will see ‘Keep Out’ signs vanish from practically all the traditional areas of male employment, from

ditch-digging to captaining airliners.”

Sociologist Keller agrees. “Life-long labor and life-long motherhood, those twin pillars of a gender-divided society, are succumbing to the winds of change,” she asserts.

Working females will constitute 58 percent of workers by the turn of the century,

“Working females will constitute 58 percent of workers by the turn of the century. As early as 1985, the white, male family breadwinner whom we have known as the ‘typical’ worker will in fact be in the minority.”

estimates corporate employee relations expert James H. Jordan. “As early as 1985,” he says, “the white, male, family breadwinner whom we have known as the ‘typical’ worker will in fact be in the minority.”

Management specialist Pat Burr sees the female impact on the work force catalyzing

some welcome changes. “Humanizing the work timetable—providing more opportunities for flexi-time, part-time and shared job arrangement—is being demanded by women’s organizations.” Flexi-time, a system that allows workers to tailor their own schedules to suit their individual lifestyles, is already working successfully in experimental projects. Strong indications are that flexi-time increases worker productivity and satisfaction. All signs point to future employees having more say in structuring their jobs.

“The most needed changes,” according to A.H. Raskin, “are those that make the worker a full citizen inside the office or factory, involved in all the decisions that involve him.”

Needless to say, continuous advances in technology will do their part to change the very nature of work.

“The U.S. is currently entering what might be termed the ‘second computer revolution,’” says Hudson Institute economist Irving Leveson. “The effects of the computer on society will parallel those of advances in transportation, communications and energy in earlier generations.”

Pointing to the advent of electronic mail, electronic libraries, the paperless office and the checkless society, futures research specialist Walter Hahn says, “Today’s managers, secretaries, clerks, accountants and others work in a paper-bound office. But in the future they will work in electronic ones. Most of the printed paper routines that consume so much time and space will be gone.” And he takes the concept one step further. “If you



can install the advanced word processing and communications systems in an office-office, obviously they can also be installed in a home-office. And predictions are that their numbers will increase very rapidly."

Such a development will eventually lead to wider options concerning *where* you work. Any job performed in close cooperation with a computer terminal may be done as efficiently from your residence as from your official place of business. Communicating to work, rather than commuting to work, may become a viable alternative. While it is unlikely that people will overwhelmingly desert the social contact afforded by the workplace in favor of jobs they can do from home, it may become common for new mothers or temporarily disabled employees to resume their work—via computer link-up—before they are ready or able to return to the office.

Technology will have wide-ranging effects on the nature of work, and experts agree that technological advance is crucial to economic growth and better standards of living for all. Says Citibank's Vojta, "We have only to look around us at the extraordinary new tools that are rapidly becoming available, from computers and satellites to biofeedback teaching techniques, to realize that we are in the midst of an explosion in the techniques of acquiring and using knowledge. This is precisely the kind of situation that attracts the entrepreneurial genius."

Futurist Walter Hahn sees another area that should concern us now, if future work satisfaction is to be assured. "The *lack* of adequate social technologies may have even more significant and larger impacts on the

nature of work in the 21st century," he warns, "than the consequences resulting from the rapid and seemingly ubiquitous information technologies."

Stewart Brand, originator of the *Whole Earth Catalog* and publisher of *CoEvolution Quarterly*, voices an optimistic outlook for

Any job performed in close cooperation with a computer terminal may be done as efficiently from your residence as from your official place of business. Communicating to work, rather than commuting to work, may become an alternative.

improved social technologies. "I'm assuming relative continuity from the present through 2025," he states, explaining "lives governed more by choice than by necessity." Brand describes what he sees as the new, improved "texture" of the workplace: "Greater continuity of staff, more familial amenities, more individual direction of hours and vacation,

more individual responsibility for tasks, less supervision from above and clearer role definition."

"There is likely to be a diminishing appetite among Americans for the traditional rigidities of the workplace," notes labor expert Raskin.

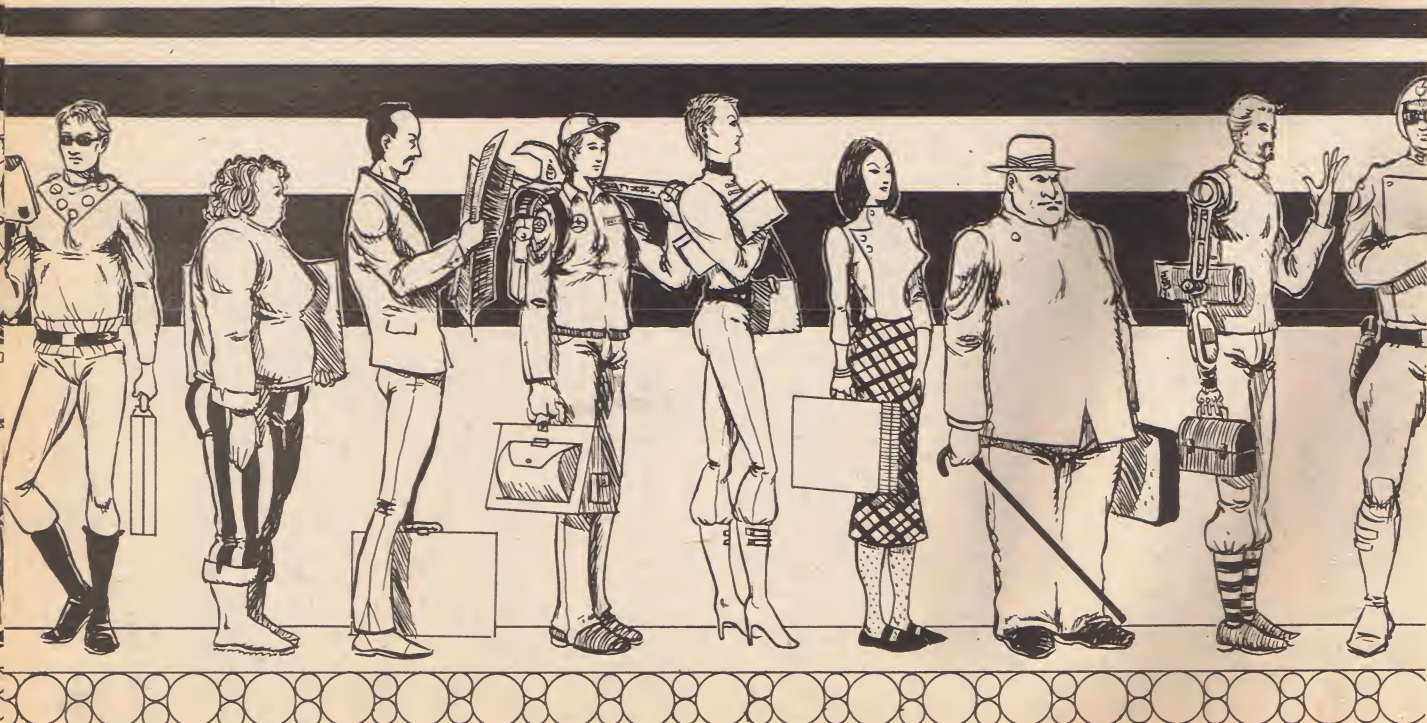
So alternative work schedules are almost a given, and most will agree that the four-day work week is a probability in the near future. Other future developments are likely to include longer annual vacation allotments, businesses adopting the academic concept of the sabbatical and an increased emphasis on intrinsic job satisfaction.

And in the 21st century, "success" will be measured less by counting material possessions and more by such intangible benefits as freedom to travel, learn and enjoy life.

Business professor Behrman goes so far as to speculate that in the 21st century, "We will be counting non-market goods in a new conceptualization of GNP as 'Gross National Progress,' or even counting intangibles in a calculation of 'Gross National Happiness!'"

And what about that familiar utopian future where the robots and the computers do all the "work" and humans try to keep busy having a good time? Not many crystal ball gazers can see that day arriving in the century to come. But a more acceptable alternative is proposed by Isaac Asimov.

"We stand a good chance, if civilization survives, of experiencing in the 21st century, for the first time in history, a truly leisure society for all, in which the very word 'work' will have to be redefined into something pleasant." E



Super Powers Made Simple

A young science advocate shows you how to make your own magic.

By BARBARA KRASNOFF

A good scientific background can balance out the ignorance and power balance in the world," asserts Cy Tymony, 24-year-old scientist, auto mechanic, magician and business entrepreneur. He pauses. "I think that the world is ruled by whoever has the greatest scientific power, and by whoever can control and expand that power. I believe that 95 percent of the world's problems—major, and on an everyday, out-on-the-street sense, too—can be taken care of, because most of the solutions are written down someplace. But most people just don't take the time, or care. My thing is to get them interested in learning it."

This philosophy of "science equals power" is the major theme behind Super Powers Enterprises, a mail order concern under Cy Tymony's sole ownership and management. Three years ago, he combined an enthusiasm for science with a shrewd analysis of marketing in order to sell his project to the science-shy, school-age comic book crowd. "I was going through Chicago's Old Town section," he recalls, "and there was a comic book shop. I hadn't read comics for years, so I went in and bought some old ones, some new ones. . . . I was reading them that night, and then something stuck in my head: In all these years of comic books, there was a big common denominator. Most of the comic book heroes have super powers. So I figured that, if somebody could come up with a way to produce super powers, even in a strained sense, he should do pretty good."

So Tymony put together a 70-page booklet, simply written and illustrated, entitled *Super Powers Made Simple* (\$3.00 at P.O. Box 49507, Chicago, IL 60649). On the cover, a red-clad super hero-type proclaims, "Now you can have super powers!" Inside are instructions on how to open doors with a magnetic "power ring," how to build a "radio control jacket," and other such



According to science buff Cy Tymony, science knowledge equals super power.

gadgets that will appeal to a teen and preteen readership.

But in addition, the booklet includes illustrated explanations of the workings of the five senses (under the title "Natural Super Powers"), and frequent exhortations for the reader to expand on the principles set out in the pamphlet through his/her own efforts. "Your environment is your input," it reads. "If you don't add new awareness, the output will be limited. When you add to your input, you add to you."

This is the approach Tymony thinks is necessary to interest kids in something other than the latest disco records. "Most people who spread science spread it in a way that's not too colorful," he says. "It turns some people off and doesn't really get through. So you need some kind of vehicle, because scientific investigation isn't really a popular pastime for people's spare time."


In order to sell his booklet, he placed several small ads in science fiction magazines and comic books. The response was, and continues to be, enthusiastic. Kids responding to his advertisements not only send their orders for books but often include suggestions for various projects of their own design. When an article about him was published in the *Chicago Tribune* last spring, Tymony received over 200 letters from approving parents.

And what is the future of Super Powers

Enterprises? Well, as far as Cy Tymony is concerned, *Super Powers Made Simple* will remain on the market indefinitely, providing him with a steady income and enough time ("It only takes a few hours a week") to study and work on other projects. Such as a book of electronic gadgetry entitled *99 Disco Gift Ideas*, to be published sometime this year.

Or this one: "I'm going to set up a small science city. It will be a storefront place where people will come in for no charge, and I'll have magazines, scientific equipment apparatus and meeting rooms. I'll start out small. It'll be a place where people in the community can come in and study, and just be with people who are interested in that area. Young and old—they can come in and read, experiment with science, and we can take field trips to different places. . . . That's one of the major things I want to do, because it's something I wish that I had when I was young."

And if Cy Tymony wants to do something, the odds are that he will get it done. "There are people out there who like science," he insists, "who are interested in future concepts and things that a lot of people aren't interested in. But if their motivation isn't kept up, or if other things take up their time, it can drain them and they might lose interest. And we might lose another Edison or Einstein."

"So I'd like to do whatever I can to keep that motivation up and help it grow." 

The Quatermass Conclusion: British Revival Headed For the U.S.

A spaceship returns from outer space with only one of its three-man crew "alive." His companions are nowhere to be found onboard the vessel. They have apparently vanished into thin air. The entry hatch of the ship is still locked and has remained so throughout the journey. The missing astronauts' space suits lie forlornly on the cabin floor, the interlocking units of their inner suits still intact.

What has happened aboard the U.K. space probe?

In 1953, thousands of British television viewers sat mesmerized in front of their sets in an effort to find the answer to the outer space mystery. The story evolved on a weekly serial by Nigel Kneale entitled *The Quatermass Experiment*. Starring Reginald Tate as Professor Bernard Quatermass, the show quickly became the most popular presentation in Britain; a milestone in both science fiction and TV programming in general. Adults were riveted to their seats. Children watched from a safe distance, not wanting to meet the space villains face to face. The show's theme music, the Mars passage from Holtz's *The Planets*, became the most recognized melody in the country.

By year's end, Professor Bernard Quatermass was a cult hero.

Author Kneale penned two other six-part serials for the BBC: *Quatermass II* (1955), starring John Robinson, and *Quatermass and the Pit* (1959) starring Andre Morell. The

TV programs spawned a series of successful films: *The Creeping Unknown*, *Enemy From Space* and *Five Million Miles To Earth*. Then, Quatermass disappeared from both the TV and the movie screen.

Until now.

Over a quarter of a century after the original TV series was first aired in Britain, the fourth installment of the saga has been filmed in the U.K. Scripted by Nigel Kneale for Independent Television (ITV), the four-part serial stars Sir John Mills as intrepid scientist Quatermass. The series, directed by Piers Haggard, is part of ITV's 1979-1980 season, and will be shown in the United States theatrically as *The Quatermass Conclusion*.

The story takes place towards the end of the 20th century, during the reign of King Charles. Civilization is on the verge of collapse. The streets are littered with wooden barricades. Armed gangs and mercenary squads of Pay Cops prowl the streets. Desperate shortages of food, fuel and medical supplies have brought looters out in force. Every kind of social structure is either under strain or has disappeared altogether.

"It's a kind of Belfast situation," author Kneale explains, "imported to London."

Many of England's younger people flee the violence of the cities and wander through the countryside, lapsing into a return of primitive mysticism. They call themselves the Planet People and believe that, somehow, they will be taken to a better life on another planet.

They look to Stonehenge as a key to their future.

In Kneale's scenario for the future, America and Russia still squander money trying to outdistance each other in the space race. Professor Quatermass, now retired from the British Experimental Rocket Group, journeys to London from his home in Scotland to take part in a television panel show celebrating the newest space launch. The professor, horrified at the turn the future has taken due to speedy progress, is now vehemently anti-science. His one concern is to trace his missing granddaughter. He uses the TV panel to publicize his search.

While Quatermass is on the air, denouncing the current scientific schools of thought, something goes wrong with the space launching. Because the professor has publicly denounced it, he is suspected of sabotage. But the malfunction of the spacecraft has nothing to do with Earthly saboteurs. The event is the first sign of an approaching alien force; a force which will eventually bring forth Quatermass, the quintessential space scientist, once again.

Stalwart Quatermass fans will notice a major change in Kneale's newest alien presence scenario. In the old days, the alien force was a definite monster-on-the-loose ploy set against a normal, civilized Earth background. This time out, it's humanity that's quite monstrous in nature. "In the new Quatermass," the author explains, "the background of civilization in chaos seemed to me to be the horrific element and the intrusion is by the remaining shreds of normality represented by Quatermass and his allies."

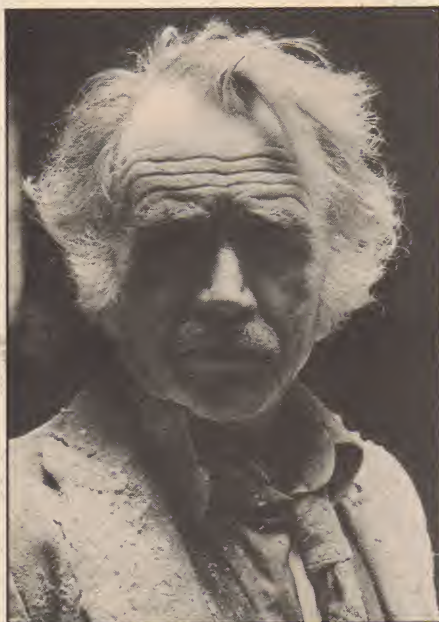
"The story is about something which does seem to be strongly at work in the world today: the polarization between faith in magic and faith in scientific observation and knowledge. I definitely side with the latter. I'm dead against the loony thing of bringing on the magic."

In the new Quatermass tale the Planet People, dressed in ponchos and wearing painted 'P's on their cheeks, symbolize the magic; roaming around England in a mindless search for salvation. Quatermass and astronomer Dr. Joe Kapp (Simon MacCorkindale) represent science.

Yet another new wrinkle in the ITV series is the *type* of science fiction used in the screenplay; a type unlike the strain usually found in contemporary film. "The Quatermass trick in the 1950s," Kneale confides, "was to involve the audience's imagination. It had to be that way, because we had no advanced television technology. The first three series were all done live, against fearful odds, with some of the most anti-



On location: Sir John Mills, Nigel Kneale, producer Ted Childs and Mrs. N. Kneale.



Above left: Sir John Mills portrays embittered scientist Quatermass. Set in the near future, *The Quatermass Conclusion* portrays a Dystopian society, practically devoid of law and order. Above right: Quatermass is mugged in the streets of London by deranged hoodlums.



Simon McCorkindale and Clare Barbara Kellerman with Sir John Mills on the set.

quated equipment in the world and very few special effects.

"So, if you are writing science fiction in those terms, you've got to hand it over to the actors and have them get across the dreads and fears. And they can only do that if they've been given credible characters to play. The audience did the rest of the work."

"I always try to leave gaps that can only be filled by the audience's imagination. You can throw them hints and, if they don't get them, they don't get the story. This way, the audience makes a big investment in the story, watching a serial for six weeks.

"Now you don't get that involvement at all by flinging a bucket of guts at people,"

Kneale continues, alluding to some of today's more popular science fiction productions. "You will get shock and squeamishness, but it ends there. To me, films like *Alien* are throwbacks to 19th century Gothic, not the late 20th century. They deal in pure shock and sometimes do it very well, but it's not my scene. If you can't involve people's imagination beyond the stage of 'Look Behind You,' you're missing a great deal. You're missing the creation of a whole structure of elements and ideas that should tingle in the audience's mind long after the film is over."

Keeping this philosophy in mind, Kneale has fashioned his newest Quatermass experiment to be a thought-provoking as well as

spine-tingling science fiction suspense. Of the utmost import to the series are the drama's characterizations and the author is delighted with ITV's casting. "There's some very talented work there," he comments, referring to the cast and crew. "John Mills, for instance, has a hugely sympathetic personality which is just right for this phase of Quatermass' life. Quatermass is now old and disconnected from any kind of scientific interest. In fact, he is rejecting what appears to be failed technology and is concerned only with family problems."

Kneale, who wasn't all that pleased with most of the filmed versions of Quatermass, is confident that when this British TV serial is released in the states it will be a controversial entry into the science fiction film genre. And Kneale is certainly no stranger to controversy. In fact, he quite enjoys it. It was Kneale who scripted the original British TV version of 1984, which nearly brought the British government to a standstill.

"The public had never seen anything like it on TV," he chuckles. "There were questions raised in Parliament and protests made by the press. Yet we hadn't cheated with the subject matter. We did it as Orwell wrote it." A few years later, Kneale once again found himself the center of video vehemence when he presented *The Year of the Sex Olympics*, a tale concerning the use of pornography as a means of controlling the population explosion.

Sometime later this year, Kneale will bring his sense of controversy and drama to America as inquisitive Quatermass meets a new breed of alien intelligence head-on in *The Quatermass Conclusion*. □

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Looking for ESP: From Card Tests to Computers

By ALLAN MAURER



In 1931, when A. J. Linzmayer, a student interested in hypnosis, dropped by the newly established Duke University Parapsychology Laboratory, Dr. J. B. Rhine casually asked him to name a card held out of sight. Linzmayer correctly identified the card... and eight more in a row. The odds against this are "somewhere in the neighborhood of two million to one," Rhine later wrote in *New Frontiers of the Mind*, a book that whipped up storms of controversy still raging today.

Rhine coined the term "Extra-Sensory

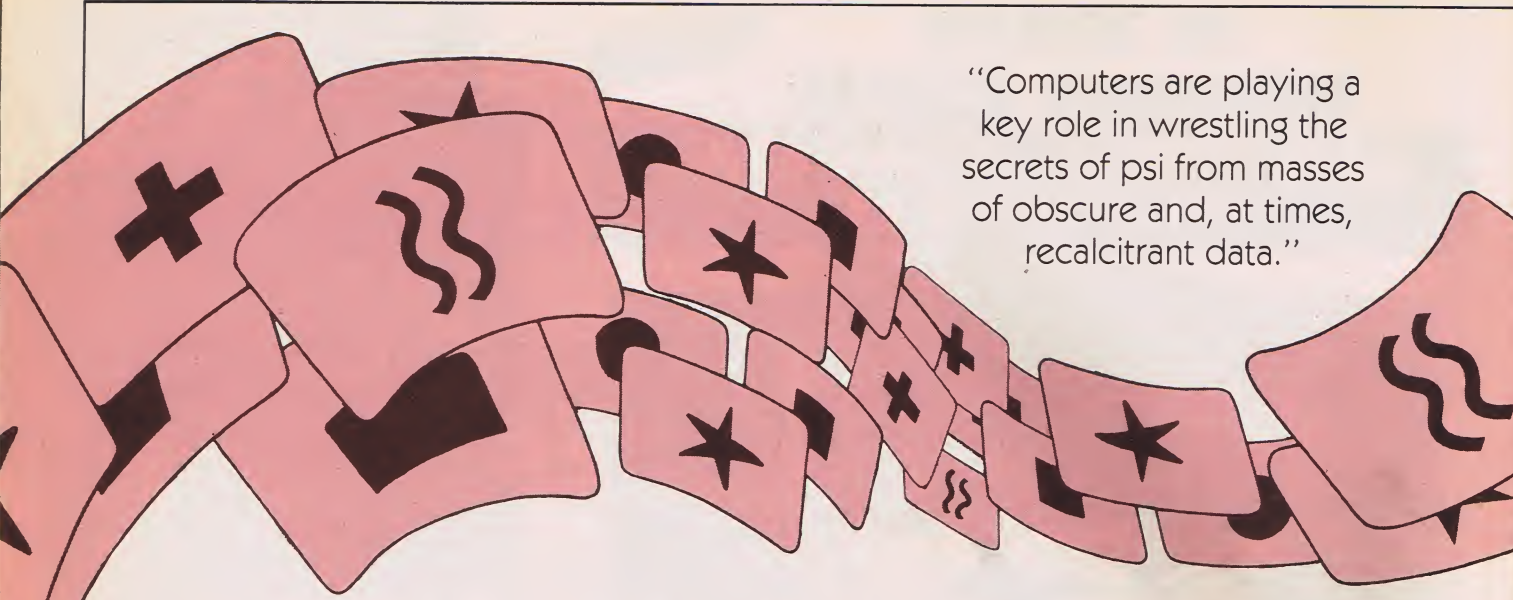
Perception" to describe what he was looking for in those early experiments at Duke. More than anyone else, Rhine and his associates are responsible for the serious, scientific attention ESP research has received in this century. But when they began their search for the elusive mind-power now referred to as "psi," there were no established methods for testing ESP in the lab. They had to find methods.

They began simply. "The casual observer would hardly have been impressed with the dramatic quality of the tests," Rhine has said. "There were none of the beakers and retorts

the chemist sets up, nor the intricate and powerful pieces of apparatus the physicist uses. Instead, there were two men, a table, two chairs, and a deck of odd-looking cards." Invented by Dr. Karl Zener, one of Rhine's associates, the deck of 25 cards consisted of five symbols—a star, a cross, wavy lines, a square, and a circle—each repeated five times.

"Almost everyone who came my way in those days was asked to try a run or two of cards," Rhine recalls.

Although the early experiments at Duke



"Computers are playing a key role in wrestling the secrets of psi from masses of obscure and, at times, recalcitrant data."

have been harshly criticized as too loosely controlled, Rhine and his associates gradually developed tighter experimental setups. In later experiments, subjects sat behind a green plywood screen and attempted to read cards turned over by a researcher on the opposite side. Subject and experimenter were in different buildings for the Pearce-Pratt tests, in which Hubert Pearce sat in a library cubicle 100 yards from the Physics Building, where Dr. J. G. Pratt turned over cards at precisely timed intervals. Some of these tests with Pearce "yielded results so far above average," Rhine says, "that statistically speaking, the odds are over a million to one against chance's being the explanation."

Other tools developed included a mechanical card shuffler and a glass-enclosed dice tumbler. The latter was used to test for psychokinesis (PK), the scary Carrie ability to move objects with mind power. Subjects attempted to make six dice in the tumbler turn up a certain "target" number. Statistical analysis of these and other tests suggested that ESP does exist, Rhine and others reported in journal articles and books.

Although the controversy never lessened, Rhine, now in his mid-80s, is still at work after four decades of research. When Duke closed its parapsychology lab upon Rhine's retirement from the faculty, he established the Foundation for Research into the Nature of Man in a large home just off the University campus in Durham, North Carolina.

There you can still see the plywood screen, dice tumbler and other early tools on display in a room open to the public. The research that goes on upstairs, however, has become considerably more sophisticated. Now a small computer does the card shuffling, and many other tasks as well.

"Computers will play an important role in meeting the challenges of psi research in the future," Rhine said from his spacious but cluttered office at the Foundation. "James Davis can tell you about that."

Davis, who joined the Foundation staff in 1972, describes himself as "general office manager," and says he "runs the computer,

handles public relations, and makes sure the roof gets fixed." A small, intense man who sounds like actor Richard Dreyfuss, he believes, "Computers are playing a key role in wrestling the secrets of psi from masses of obscure, and at times recalcitrant, data." The computer's speed and accuracy in scoring raw data "turns hours into minutes and makes some experiments economically feasible that wouldn't be otherwise," Davis says.

Another, perhaps more important way the computer helps, according to Davis, is that it "allows tasks to be conducted in an informal and game-like manner conducive to the operation of psi while affording stricter experimental safeguards." While researchers such as Davis have reached the point where they speak of "garden variety psi," the weak force that shows up in test after test, criticism from other scientists has not abated. So, parapsychologists are constantly concerned with improving their methods and tightening experimental controls.

"Computers are fairly resistant to parapsychological influences," Davis said. "They're designed to detect their own errors and an unexpected internal state that might be caused by psychic alteration of hardware would cause a computer to either report its state as being in error or to cease functioning entirely." In addition, they automatically score tests while in progress, thus keeping the experimenter blind to the outcome until the test is completed. Under these circumstances, the experimenter's reactions are more uniform and less likely to affect the results.

Computers are also used in conjunction with other products of modern technology. One, the Random Number Generator, developed by physicist Dr. Helmut Schmidt, uses the random decay of a radioactive element to determine which of four small lights will come on after a subject presses a button in front of the one he thinks will light. Allen Ingram, a "special" subject being tested by the Foundation, says that what he does there is "mash buttons." Ingram, who has been a professional soldier, boxer, and a Baptist

Minister, came to the Foundation to find a way to control the psychic power he says he's had since childhood.

Once Ingram thought he had found a way to beat the machine without using ESP. He demonstrated his method to a researcher, making a particular light come on ten times in a row. "Keep going," said the researcher. Ingram tried, but his system didn't work anymore. "It was PK," he says matter-of-factly.

While parapsychologists at the Foundation require hundreds of trials to draw a conclusion and may not agree with Ingram's, they are confident that it's hard to fool mother machine. "People who use conscious strategies on the machine get nowhere," Davis said. "They generally have a mistaken idea, for instance, as to how often a double or triple number will appear in a random series."

One man at the University of Tennessee wrote to the Foundation and asked the parapsychologists to send him 500 random numbers. They sent the numbers and he wrote again, saying, "Ah ha, I've found a system. Now I'm going to get significant scoring on another 500. Send another batch." They sent another 500 numbers—and never heard from him again.

While modern technology has given psi researchers effective new tools, it has not solved all of their problems. One area of concern to the entire field is identifying why one experimenter can get results that suggest psi is present in a given series of tests while another does not. "Something different happens when a critic does an experiment than when the successful psi researcher does it," Davis said. "Quite a lot of it is tacit knowledge and implicit procedures that just don't get into the journal articles."

Davis illustrated his point by repeating a story told by a sociologist of science who visited the Foundation. The sociologist said a group of researchers in England were trying to replicate some work done on gas lasers in California. They read the journal articles and tried to make their own laser, but could not get it to work. After reading the articles again



and tinkering with their laser, they tried, and failed, again. The English scientists corresponded with their California counterparts, who gave them several suggestions, which they followed. But the laser still would not work.

Finally, the scientists who built the original model said "Come here, look at our laser, watch us build one, build one under our supervision, then go back and try your own." After a few more tries at getting it on their own, they flew to California, picked up little things that had apparently defied communication, and when they came back they built working lasers.

"If that can happen in physics, it is not surprising it can happen in parapsychology," Davis said. Because of this problem, one of the Foundation's current interests is in identifying the "lab lore" which is not usually communicated in journals but plays a role in conducting successful psi experiments.

Where is psi research headed?

"People are improving their methodologies," Davis said, "but at the same time, the questions are getting harder." Here again, he says, the computer is helpful. It permits the use of more complex methods to answer more complex questions. But, Davis feels, since parapsychology is as individualistic as its parent, psychology, it is difficult to say what direction the field as a whole will take.

"Since we don't have graduate schools of parapsychology, many researchers take their approach from the school of psychology they're in, and no one knows what direction psychology is taking," he said. "I'm personally very interested in the effect of PK on living systems, healing, and some of the physical things involved."

Will the time come when parapsychologists can say, "If you do this in an experiment, you will get psi?"

"I doubt we're ever going to be able to produce psi on demand," Davis answers. "I think the great breakthrough will be successful experiments to test theories about how it works and what it means in the larger scope of science as a whole."

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LOWEST I IN SPACE

'Saturn 3' is billed as a sensual horror story of the future, wherein one-third of a romantic triangle is a robot Romeo.

By SAM BISBEE

Saturn 3 is both sensuous and sensual," says Stanley Donen, producer/director of this season's sexiest thriller. "It's science fiction but not comic strip. Our picture is a terrifying picture for the audience. It's probably closer to the real *Frankenstein* story than any Hitchcock thriller."

By all accounts, *Saturn 3* is definitely not a typical science fiction production. Boasting an all-star cast (Farrah Fawcett, Kirk Douglas and Harvey Keitel) and a villain that combines the best qualities of Robby the Robot and Anthony Perkins in *Psycho*, *Saturn 3* takes a standard cat-and-mouse scenario and transforms it into a nuts-and-bolts saga—with human prey openly stalked by a psychopathic robot.

Set in the distant future, the film takes place on Titan, the third moon of the planet Saturn. Hydroponic researchers Alex (Farrah Fawcett) and her lover Adam (Kirk Douglas) have turned their backs on the decadent society of Earth and have concentrated, instead, on living a pastoral life in their underground complex. Their job is to raise enough edible plantlife to keep Earth's hungry population from starving.

Their idyllic lifestyle is disrupted somewhat by the arrival of the man of 1,000 facial ticks, Captain James (Harvey Keitel), a psychotic space pilot who, in order to be assigned a real space mission, has killed his spaceship's original pilot and assumed his identity. James

arrives at the Titan base and curtly informs Adam and Alex that they are behind schedule on their research. In order to help them meet their deadlines, he has brought up robot "Hector," an eight-foot structure that is the first of the Demi-God series of metal men.

As if James' official intentions weren't upsetting enough, his private needs really begin to fluster the Saturnian couple. James is attracted to Alex in a big and less than wholesome way and, in between bouts of paranoia, offers her handfuls of Earth-produced hallucinogens to prove his undying lust. Adam is not too keen on this idea, although he later consents to take a "trip" with Alex. Swallowing a few pills, they both hallucinate about killing nasty James.

James, meanwhile, is up to no good. He assembles titanic Hector. And, since Hector is programmed from a plug leading directly to James' brain, the robot winds up with quite a few personality quirks of his own...not to mention an unhealthy attraction towards pretty Alex. James is moody. Hector is moody. In an attempt to prove his mettle, the Demi-God robot begins chasing Alex around. After carving Alex's pet dog in two, Hector grabs Alex and holds her aloft, much to her discomfort. Ignoring James' commands to put the girl down, Hector remains in his holding pattern, returning Alex to her feet only after she begs for mercy.

Seemingly impossible, things do get progressively worse for the tortured twosome, as

James and Hector both begin to vie for Alex's affection. Eventually, the two begin battling, physically, over the blonde beauty with the winner wanting to take all...although only one of them has the vaguest idea what to do with the prize.

From the outset, *Saturn 3* was envisioned as being a special kind of space opera, defying all screen taboos and avoiding all genre stereotypes. Famed production designer John Barry conceived the original idea during location filming on Stanley Donen's *Lucky Lady*. "I wrote it just after *Lucky Lady* and before *Star Wars*," Barry said at the time. He then showed the premise to Donen, who was immediately intrigued with Barry's idea. The twosome planned the film as a low-budgeted science fiction horror tale.

"I'm thrilled to be able to do it," Barry commented. "In *Saturn 3* the science considerations are all responsible. People don't do anything that isn't possible. It's more like a Western yet very much about real people. It's a love story, a story about contemporary relationships set two centuries ahead. We will be using existing technology for *Saturn 3* but it's the amount of existing technology that is very, very ambitious."

Barry worked on a shooting script during

Right: In a hallucinatory sequence, demure Farrah Fawcett goes with the flow in space.



his Oscar-winning work on *Star Wars* and his designing chores on *Superman—The Movie*. Taking Barry's script, Donen then asked novelist Martin Amis to do a final draft. *Saturn 3* came one step closer to reality.

At this point, Sir Lew Grade intervened. Told the premise of the film by Donen during the lensing of the producer's *Movie, Movie*, Grade not only expressed enthusiasm for the science fiction tale but signed Farrah Fawcett for the lead role after bumping into her on a transatlantic flight. With Grade's casting of a major name for the lead role, however, Barry's concept for a "low budget science fiction movie" bit the dust.

Born was a multi-million-dollar production. Kirk Douglas was signed as Adam after reading the script. "The idea behind this film is so fresh," he remarked, "so different than anything else I've been offered in the realm of science fiction that I didn't want to miss out on it." Harvey Keitel was signed as the spacefaring sicko, James, and *Saturn 3* got off the ground... ever-so-slowly.

Donen was named producer. John Barry was given the nod to direct. Stuart Craig, John Barry's assistant on *Superman—The Movie*, was signed to make his debut as production designer on this film. It proved a real challenge.

Shepperton Studio Center in England was chosen to house the enormous subterranean space station. By the time work was completed on the set, over 140 12-foot by 6-foot sections were erected over 60,000 feet of scaffolding. The finished interior, complete with

garage for the scientists' moonbuggy, decontamination chamber, hydroponics lab, communications center, living, sleeping and guest quarters and hundreds of yards of corridors proved so complex that, for the first few weeks of production, crewmembers were given maps of the area so no one would get lost. The two biggest sections of the interior set were quickly re-christened "Leicester Square" and "Picadilly Circus" in order to alleviate confusion.

The exterior set, depicting the surface of Titan, provided an extra hurdle for Craig. The production designer, during construction, decreed that a harsh setting would be in order since, according to the script, Titan was radioactive and poisonous. "If you show it as volcanic and really volatile, it serves to show the threat outside." And so, technicians created indoor lava pits and ridges; one of the biggest sets to be constructed in British films recently. Occupying the full area of Shepperton's huge A and B studios, the finished moon structure is 280 feet long and 120 feet wide.

Once the sets were constructed, filming began. And so did the problems of *Saturn 3*. After a short time, John Barry quietly left the project, apparently coming to verbal blows with Donen over "artistic differences." Barry, who would die a short time later while working on the *Star Wars* sequel *The Empire Strikes Back*, was visibly shaken by having to abandon his project. Ashen-faced after his departure, his sole remark concerning his enigmatic action was a slow "no comment."

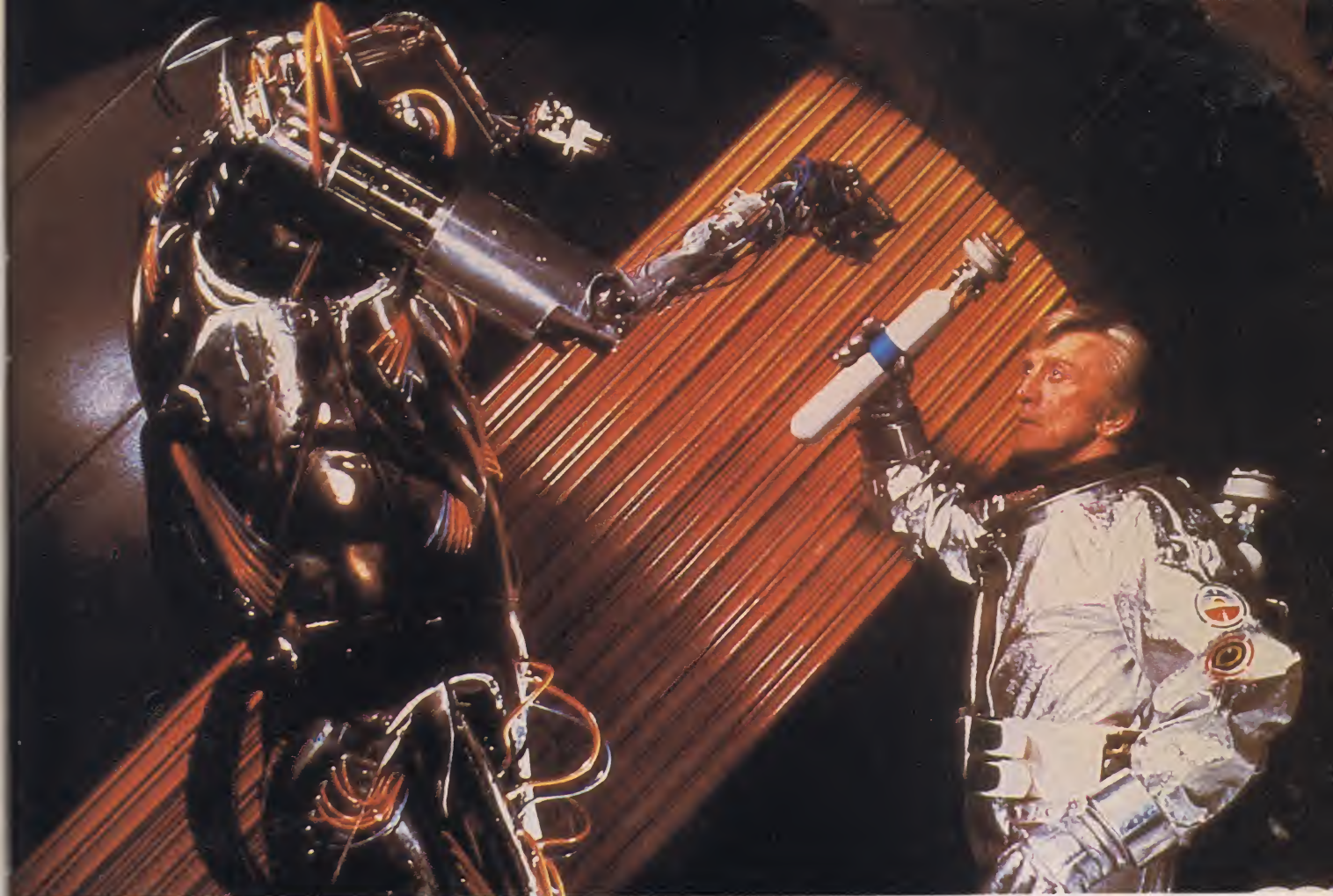
Producer Donen, at that point, stepped in to direct the epic. To this day, he offers a "no comment" statement to describe this period of time.

The problems continued. Star Farrah Fawcett, in the midst of both professional and personal turmoil (her first two films, *Somebody Killed Her Husband* and *Sunburn*, and her marriage to actor Lee Majors were not faring as well as had been expected), caused shooting to grind to a halt on several occasions due to a recurring "illness." While morale on the set flagged, Donen doggedly attempted to finish the film on or near schedule. After dozens of major and minor production snafus, *Saturn 3* was finished, with Donen commenting positively: "I can't really think of even a Hitchcock movie that is too much like this. It's meant to frighten you in an unusual way and, then, give you a sense of relief at the way it turns out."

Perhaps it is Kirk Douglas who sums up the trials and tribulations of *Saturn 3*, from its inception to its completion, by stating: "There's a great excitement and tremendous horror in it. It's an exciting script and that's what I look for in a project. If I am not excited about doing it, I don't do it. That doesn't necessarily mean it will become a success, but that it's a subject I'm prepared to gamble on."

Douglas' gamble, Barry's dream and Donen's reality will make its way to the widescreen next month. At that point, the only chance that will be taken will be on the part of the audience. **F**





Left: Kirk Douglas and Farrah Fawcett in their habitat's control room attempt to protect themselves against marauding robot Hector.

Top of page: About to embark on a tour of Titan's surface, Kirk Douglas discovers robot Hector to be a very unwilling partner.

Above: One of the dizzying interiors concocted for *Saturn 3*. The space outpost's design proved so complex that crewmembers were obliged to carry around directional maps with them during the filming. Right: Horrid Hector turns on his maniacal master (Harvey Keitel) in one of the film's more terrifying sequences. Producer/director Stanley Donen says the film outshocks Hitchcock.



PHOTOS: © 1980 AFD



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WILLIAMS

ROBOTS

ARRIVE!

While mechanical housekeepers and babysitters may still be in the somewhat distant future, robots are already making their presence felt as industry's newest blue-collar workers.

By BARBARA KRASNOFF

Haven't you always wanted your very own robot? A real, seven-foot-tall, metallic humanoid mechanical servant who will wash your dishes and vanquish alien invaders—all without batting an electronic eyelash?

Of course you do. As a matter of fact, robots—walking, talking and particularly working robots—are not really a thing of the far future. Programmable mechanical workers are now being used as a matter of course in many industries throughout the world. Computer-operated robotic spacecraft have already served as our first emissaries to the planets; the Viking spacecraft presently sitting on the surface of Mars are the first of these. The robot revolution is already underway, with more and more sophisticated robot helpers going into action—but, unfortunately, most of these will probably never find their way into your home.

The word "robot" (coined in 1922 by Czech playwright Karel Capek for his play *R.U.R.*) is defined by Webster's dictionary as "an automatic apparatus or device that performs functions ordinarily ascribed to human beings, or operates with what appears to be almost human intelligence." While the first half of that definition can be applied to any of the industrial machines that have been used by humanity since the 19th century, it is the keynote word "intelligence," or its electronic equivalent, that distinguishes a robot from a vacuum cleaner. A machine must be operated; but a robot can operate itself.

Those of us weaned on science fiction are tremendously eager to play with the type of walking, talking metal men featured in such films as *Star Wars* and a multitude of novels. And there are several manufacturers that are quite willing to fill that need, whether honestly or not.

For example, a New Jersey-based company called Quasar Industries caused quite a stir last year with their new domestic robot. The robot was supposed to be highly intelligent (for a robot), and able to mind the baby, answer the door and climb the stairs. Quasar even sent out a few models to demonstrate their versatility. Unfortunately, these electronic ambassadors were found to be remote-controlled by two men with black bags; one handling the movement, the other

the voice. Undaunted, Quasar executives still claimed that they had invented the perfect household robot, and that it would soon come on the market. The world is still waiting.

A more authentic domestic robot is the kind that hobbyists and technicians build on their own. Many of these mechanical "pets" are capable of independent movement around obstacles and a few can even respond to commands, after a fashion.

If you are not technically oriented but would like to *appear* to own a robot, you can always rent one. Companies such as the Android Amusement Corp. of Arcadia, California are willing to rent or sell relatively complex mechanisms that will play games, crack jokes and circulate through a crowd—all with the aid of a human operator standing at a discreet distance. And the younger set has a variety of electronic "robot" toys to entertain them, most of which possess the traditional number of arms, legs and sensory organs.

On the other side of the coin, serious manufacturers and users of today's real robots do not care what their robots look like. In fact, some are actually suspicious of the technicians who are planning to make robots more humanoid in appearance and function. According to Lawrence Kamm, president of the Modular Machine Co., "Many of the people in the robot business are trying to make a robot with human characteristics—an imitation man or Frankenstein. But that's the last thing a manufacturer needs. He wants a machine which is economical and which makes products. He doesn't want entertainment toys."

The Modular Machine Co. manufactures Mobots—simple and easily assembled robots that will perform uncomplicated tasks such as loading or unloading from a stack of parts, sorting, inserting, or a combination of these. They can be programmed to handle materials that are rugged, fragile, porous or slippery. They resemble metallic tinker-toy assemblies—but they perform a task with a measure of independence, and therefore are real robots in the sense that Quasar's cute mobile constructs are not.

Today's industrial robot is actually a very complex unit: a marriage between a programmable computer and an efficiently operating

mechanical body. Every necessary motion, every adjustment for possible error, must be carefully programmed into the machine; and therefore a machine that will perform a limited number of simple tasks bears a minimum price of \$10,000. More complex robots can run as high as \$150,000—and that doesn't include the cost of altering the workplace to fit the necessary specifications.

One man who knows a great deal about today's "blue collar" robots is Joseph F. Engelberger, president of Unimation, Inc., the largest manufacturer of industrial robots. He also sees robotic workers as a new and sophisticated piece of machinery rather than an intelligent toy; a natural development of technology to fill in a gap only recently opened.

"After World War II," says Engelberger, "there was economic and social pressure to replace people in some of the more menial jobs: die-casting, forging, spotwelding... many tasks both unpleasant and boring. Until recently, most of these jobs were done by hard automation—that means purpose-filled automation. For example, we don't need to use robots to make Coca Cola bottles because we know those bottles are going to be forever."

"But you don't know for sure what model car you're going to make every year; you get a lot of styling changes. You need flexible automation. Flexible automation is what a robot is; a kind of machine which is useful between the human worker and hard automation."

Unimation's "flexible automation" units are gleaming futuristic machines that consist of a large, square control center to which a long, versatile "arm" is attached. These arms, and the claw-like "hands" utilized for grasping, are built to imitate the basic movements of a human hand and arm—side to side, up and down, and swivel. In this way, the industrial robots can be programmed to perform a variety of tasks—forging, welding, carrying and others—which had formerly been done by human workers. However, unlike their sentient predecessors, many of the Unimate robots can handle loads of up to 500 pounds, and temperatures from 40 to 120 degrees Fahrenheit. As far as Engelberger is concerned, this is an advantage for both industry and labor.

"You might have a man holding up a 60 pound welding gun," he explains. "He's got to move it around and take all the flanges of the car body and weld them together. A few hours of that is very tiring. That's probably become the number one job that robots do right now. We have about 3,000 of them all around the world, and I would guess about 1,200 of them are spot-welding car bodies.

"We do a lot of work molding plastic. You know those big plastic garbage cans? It's a very dangerous thing to have a human walk in between the dies [molds]. There have been fatalities. If a robot happens to leave an arm there, there's no harm done—just put another arm on the robot."

Another lure of the robot for industry, he maintains, is in its eventual cost-saving. "When we put our first machine in," Engelberger says, "an automotive worker earned \$3.80 an hour, and that was in 1961. Today, an automotive worker makes \$15 an hour. The all-told cost of the Unimate robot is approximately \$4.50 an hour. That means the cost of the machine, the cost of depreciation, the cost of the maintenance—everything to take care of that robot—\$4.50 an hour.

"There's a tremendous economic pressure to replace humans with robots, particularly in jobs where factories can no longer get help. The United Auto Workers recently said that our young people won't even take those jobs. So all those pressures come together and industry opts for robots."

But how do the workers feel about this? According to Engelberger, the industry is be-

ing very careful about any kind of massive displacement of human workers, preferring to let natural attrition open places for robot helpers. "I don't know of a single case where anyone has specifically lost his job when a robot went in to work," he asserts.

Apparently, most union leaders agree, so far. A United Auto Workers representative at Bell recently went on record as stating, "The UAW position has been not to resist technological change, but to harness it for the benefit of the workers."

However, there have been some dissenting opinions on that score. A letter published in the *New York Times*, written by a member of the UAW public relations department in Detroit, told the story of some factory workers who complained about excessive heat from their machines. Instead of air conditioning the room, the management replaced the workers with robots. Unfortunately, the robots soon began malfunctioning, and the technicians called in to solve the problem found that it was simple—the room was too hot. Air conditioning was immediately installed. "The lesson, I guess," concluded the writer, "is that when the robots refused to work the heat was on the company."

Striking robots aside, the robotics industry is certainly thriving. In 1978, the robot manufacturers pulled in \$60 million in sales, and they expect the figures to climb in the next few years. Such a quickly expanding business is certainly not going to be restricted to large manufacturers and corporations. Therefore, while the robots produced by

companies such as Unimation and Modular Machines make up the majority of today's automaton workforce, they are certainly not the only types in existence.

For example, the nuclear industry has found Herman a very handy helper in a crisis. Herman is the popular name for a mobile manipulator owned by the Oak Ridge Y-12 nuclear plant. Attached to its control by a 700-foot "umbilical cord" cable and capable of lifting 160 pounds, Herman has already been used to recover radioactive material: in 1975 at the University of Rochester, and again at the University of the South in Sewanee, Tennessee. It was brought in on a standby basis to handle things at close range if the need arose during the emergency at Three Mile Island nuclear plant, but was never actually used.

A more artistic example of robotic skill is the spray-painter currently being produced by Binks Manufacturing in Illinois. This rather fanciful-looking automaton "learns" its job by being guided through the appropriate motions by a human operator. The movements are recorded by the computer-operated control unit, and it will follow them precisely on its own, for as many times as is necessary.

There is a plethora of other robotic servants currently in use: A small, wheeled "mail robot" that delivers the daily post to employees at New York's Citicorp; the T3 robot manufactured by Cincinnati Milacron, which can not only decide the most efficient movement for a particular task, but can help its technicians locate its own problems; the robot produced by Hitachi Ltd. that is capable of inserting a piston into a cylinder—a very simple movement for a human, but a complicated exercise in dexterity for a robot.

And that is where the catch comes in. For all their ruggedness and economic value in today's high-production marketplace, robots are simply not bright or versatile enough to perform any but the least complicated of tasks. Something as elementary as the act of selecting a part from a moving belt, altering it in some way and then replacing it on the belt demands a coordination—and, if you will, intelligence—that most of today's automatons are unable to handle. "It has nowhere near the ability to adapt," explains Unimation's Engelberger. "If I take an idiot, I can put him in front of a machine and say, 'Here is a box of parts. You pick them out of this box and put them on the table.' A robot can't do that, because the robot is baffled by a jumbled box of parts. An idiot can reach in and orient the parts and put them in a fixed position, but there's no robot yet that can solve that particular problem. This is called the nit-picking problem. I would say within a decade robots will have sufficient vision capability to solve that problem."

This view may be rather pessimistic. As in many of today's computer industries, we may progress faster than expected. Already there are two robots now in the final stages that are capable of solving that "nit-picking" problem: one at the University of Rhode Island,

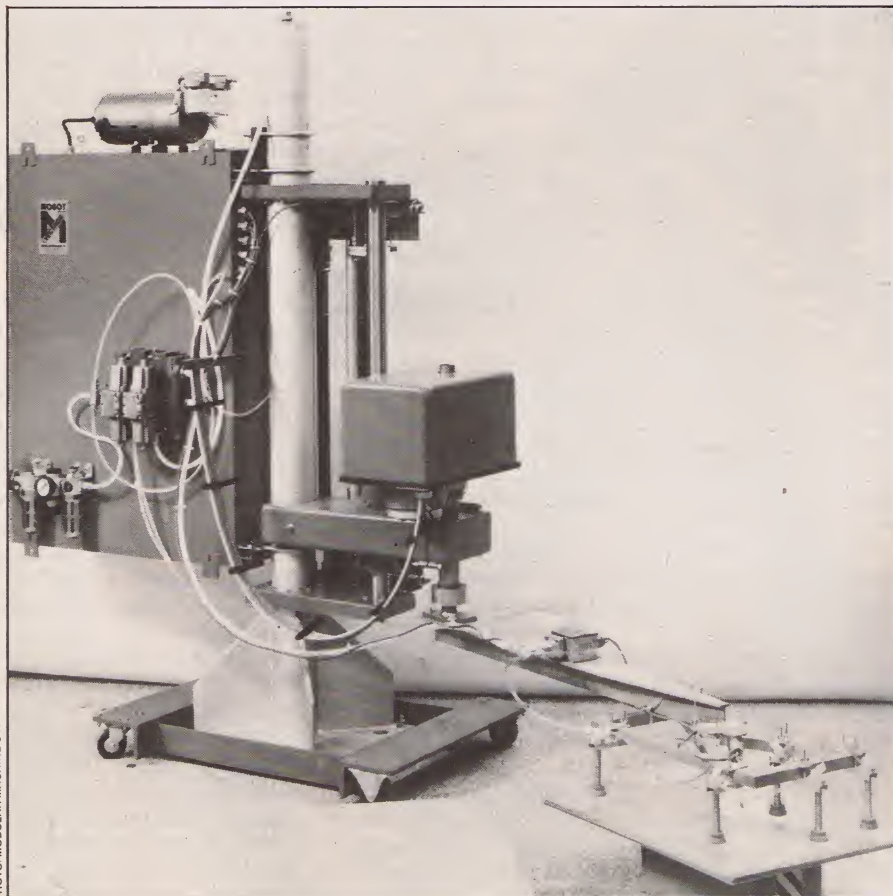


PHOTO: MODULAR MACHINE CO.

The Modular Machine Co.'s Mobot is a simplistic robot, but it satisfies the needs of manufacturers.



PHOTO: BINK'S MANUFACTURING CO.

This robot's "tentacle" holds a spray nozzle. Once "taught" the moves by a human, it can paint walls or even cartoons.

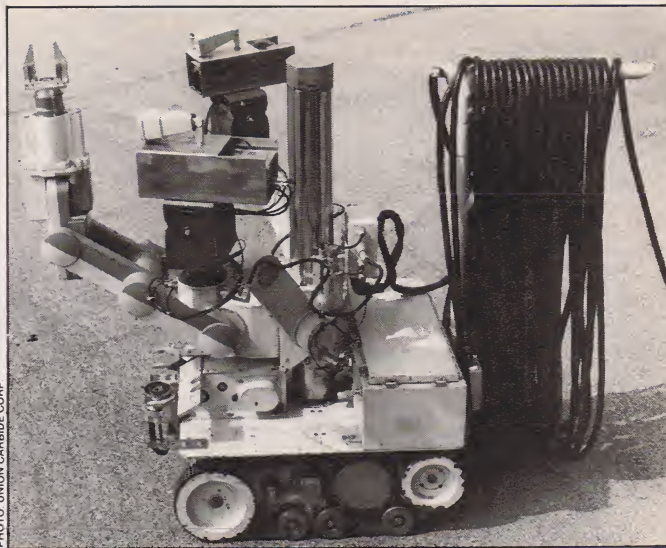


PHOTO: UNION CARBIDE CORP.

Herman, the now-famous Three Mile Island standby, can venture where humans do not dare—into highly radioactive areas.

where a team of researchers has programmed a Mark IV robot to select parts from a jumble; and the other at SRI International in California, where television cameras in the ceiling help a robot select a specific object from a table.

Researchers and technicians around the country (and the world) are working to make robots more versatile, intelligent, and, perhaps, more human. At Carnegie-Mellon University, a robot is being taught to understand spoken orders; at Ohio State a professor is trying to develop a robot that would walk on six legs; robots are being built for speech and with a "sense" of touch in order to help them select among items.

One of the more important recent developments is the increased use of smaller, less

expensive machines to assemble delicate products. Such corporations as Texas Instruments are using camera-guided robots to manufacture watches and calculators. General Motors is developing its own robot that will be able to assemble car radio speakers; and Unimation is preparing to introduce its Puma industrial robot, which will be all of 13 inches tall and weigh about 15 pounds.


One area in which robotics may prove to be more than a modern convenience is in space exploration and industrialization. Until it is ascertained that it is safe to send men and women on long journeys into space, and until we can devise relatively foolproof ways for them to explore dangerous and unfamiliar extraterrestrial objects and planets, robots are the best (and most economic) method to collect the necessary data.

Originally, the orbiters and sputniks were little more than extensions of earthbound computer systems, capable of little, if any, independent action. However, as we slowly progress further and further into the solar system, there will be increasing difficulty in transmitting data and commands (a round trip communication to and from Mars can take from nine to 40 minutes—which could prove awkward if, say, an exploratory robot suddenly came across a new form of life and wanted to know what to do with it). This makes it more and more important that our spacecraft and landers have some autonomous capabilities.

A few already have. The two Viking Landers, which have been transmitting data back to us from Mars on an irregular basis since July of 1976, are each equipped with a guidance control and sequencing computer that determines the lander's actions either through Earth-originated commands or through programs that had been stored in advance. For example, each Lander had in storage programming that could independently control its actions for its first 22 days on Mars without any instructions from Earth.

Scientists and technicians at New York's Rensselaer Polytechnic Institute, under a grant from NASA, are now developing the Martian Rover, a mobile unit about the size of a Volkswagen Beetle that will be able to find its way around the surface of Mars totally on its own, with a minimum of human guidance. Using television cameras and other sensors, the Rover will be able to pick its way around rocks and other obstructions, and avoid craters and cliffs, while picking up samples for analysis. While the present Rover is only an experimental model (it has not yet been designed to withstand the temperatures of Mars, and the computer is still a separate unit), researchers hope eventually to have a workable, relatively independent, wheeled Rover on the surface of Mars. However, because of several considerations (many of them economic), this may not happen for several years yet. According to Professor Dean Frederick, one of the leading members of the team developing the unit, "I think that the kind of challenge that we have here would keep us going for certainly another 10 to 15 years if it were actively funded and pursued. And given that it will go into limbo and then come out of limbo at some point in time, I think it's probably good for 20 to 25 years."

But while space robotics are still basically a thing of the future, scientists agree that they will have a major part in our space programs. As the distance increases between point of origin and point of destination, the spacecraft themselves will need the ability to cope with emergencies and unexpected situations without direct orders from Earth. And in developing space industry, robots could be an invaluable tool in setting up structures in space, especially where construction may have to be done away from the shuttle.

But where in this future scenario, you may ask, are such interesting creations as *Star Wars'* R2D2 or Isaac Asimov's automated household helpers? Well, perhaps they are not so impossible after all. If in the 20th century we can produce robots that see, hear and speak, can a thinking robot be far away? 

Quasar's highly touted robot was actually a remote-controlled electronic toy.



PHOTO: QUASAR INDUSTRIES

Disney's Calculating Camera

Push-button filmmaking comes of age

Breathtaking miniature sequences are being created with the new ACES computer controlled camera system

By DAVID HUTCHISON

One of the Walt Disney studios' massive sound stages is beginning to look a little like a NASA control room. It's the same Stage #3 that was built for *20,000 Leagues Under the Sea* in the early 1950s, when the studio began to invest more and more time in live action production. But these days the great tank in the floor is not filled with water or a model of the *Nautilus*. The tank is empty and covered except for a section that allows the lower half of an enormous scenic backdrop to hang below floor level. The drop is painted with stars, star clusters and great gossamer fingers of glowing interstellar gas.

Facing this gigantic galactic curtain and mounted on the floor of the stage are shiny twin tubular steel tracks that extend 68 feet to the rear wall of the studio. There, in a glass-enclosed humidity-controlled environment,

are the banks of the NOVA 3/12 computer system from Data General. Computer video terminals and display screens can be seen in abundance both within the glass cage and alongside the gleaming metal tracks where a complex series of servo motors and metal arms and platforms rest. A long crane arm extends from the center of the "car" that rides on the tracks. Cables, some two and a half inches in diameter and containing up to 150 pairs of wires, form a long umbilical cord back to the glass cage.

It could be equipment borrowed from Berkeley's atomic physics lab or a testing bench for a new NASA space probe. But it isn't. It's for fun. It's for making movies. It's ACES.

ACES, or Automatic Camera Effects System, was developed by the Disney imagineers for *The Black Hole*, the studio's first

entry into high budget SF production.

Don Iwerks, son of Ub Iwerks, longtime Disney associate, was the project manager for the team that developed ACES. "It was a year ago last January when it became apparent from the script of *The Black Hole* that we were going to have to have some sort of camera system that was capable of precise programming and repeatability."

Repeatability would allow the Disney directors and cameramen to shoot their effects "in the camera." That is, the effects would not have to be shot separately and combined later in the optical printer. A greater sense of reality could be maintained if the different elements of an effects shot could be recorded one at a time in the camera on a single piece of film, instead of assembled later from many pieces of film on the printer. The processing steps on the printer tend to "degrade" the original image and nothing beats the quality of effects shot "in the camera" on a single piece of film.

"After talking with special effects people Eustace Lycett, Art Cruickshank and Peter Ellenshaw," explains Iwerks, "we were able to determine the design parameters of the system—what the camera would have to do, how far it would have to travel, how accurately, etc." It took about three months, until March of 1978, to complete the specification manual for the system.

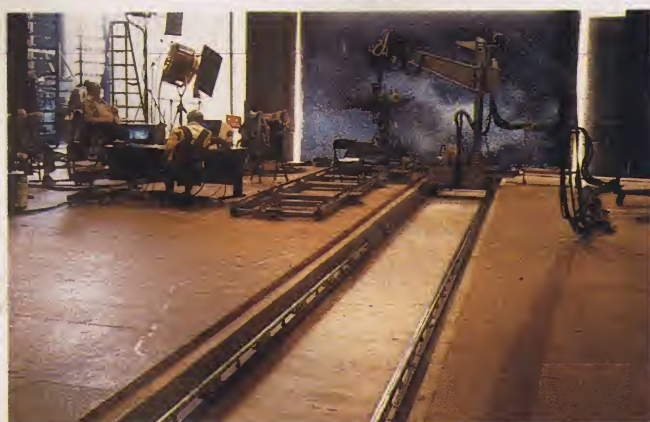
David English, systems and electronics engineer on the ACES team, picks up the story. "We spent a good deal of time trying to find out as much as possible about other new camera systems that had been developed. We were hoping to find something that would meet the needs of the company, so that our recommendation would be to just buy it. We knew that we were going to need the system for *The Black Hole* by the first of August and



The Black Hole team at the ACES console, Cruickshank (left) and Ellenshaw up front.



PHOTOS: © 1978 WALT DISNEY PRODUCTIONS



Top: An ACES camera point of view of the *Cygnus* in deep space. Left: The ACES camera track with the smaller model track at left, heading for the spacey backdrop. Right: A view of the computer and control systems for ACES in their cooled, enclosed environment.

here it was mid-February. It was going to be awfully difficult to get everything up and going by the first of August! Just the computer itself was quoted at four months delivery! We were really hoping that there was something available that would do the job... it turned out there wasn't."

"We really had an impossible deadline," agrees Iwerks. "It was in the middle of January that we were talking about the

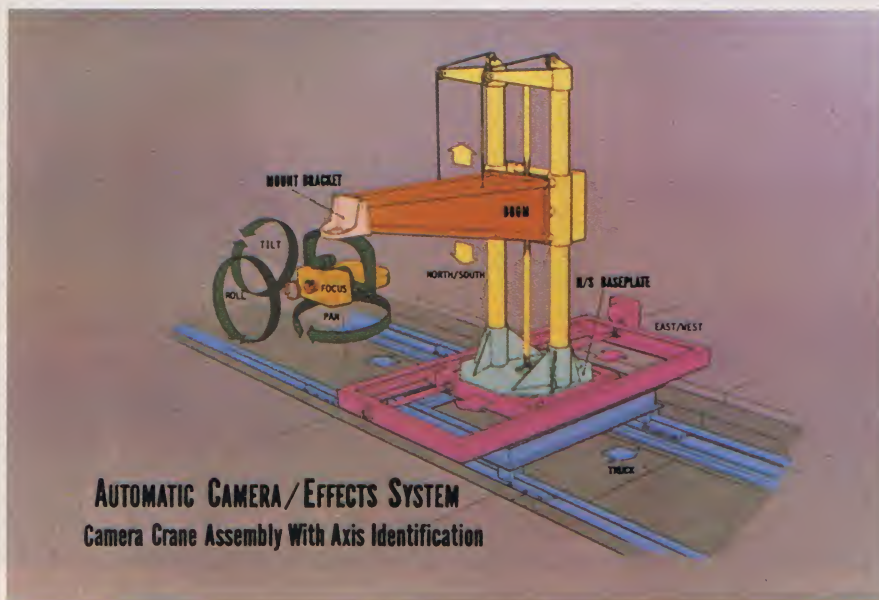
necessity of having the thing, but it wasn't until the first of May that we were actually able to start ordering or building anything. We had the system operational by the latter part of September. It was an enormous project that involved a lot of people's expertise. Amazingly, it all worked out well and came together."

The Automatic Camera Effects System is the first truly computer-operated camera

system to be applied to film production. The ACES system calculates camera moves and then sends the appropriate signals to the camera and the servo-motor drives to execute those moves. The system has a repeatable positioning accuracy of .01 inch on the dolly and .01 degree in rotation! As far as the Disney engineers are able to determine, no other available camera system has such a degree of accuracy.



The Automatic Camera Effects System made this complex docking maneuver seem easy.



What makes the ACES system a giant step forward in the fast developing field of motion control cameras is the fact that the computer *calculates* the moves of the camera. How does this differ from, say, the Dykstraflex of *Star Wars* fame? David English explains. "The Dykstraflex system allows you to move a camera through several axis of rotation by manipulating a 'joystick control.' The computer *records* the moves, one axis at a time. These recorded moves can be played back at various speeds. . . which is great. That movie and its technology laid the groundwork for ACES."

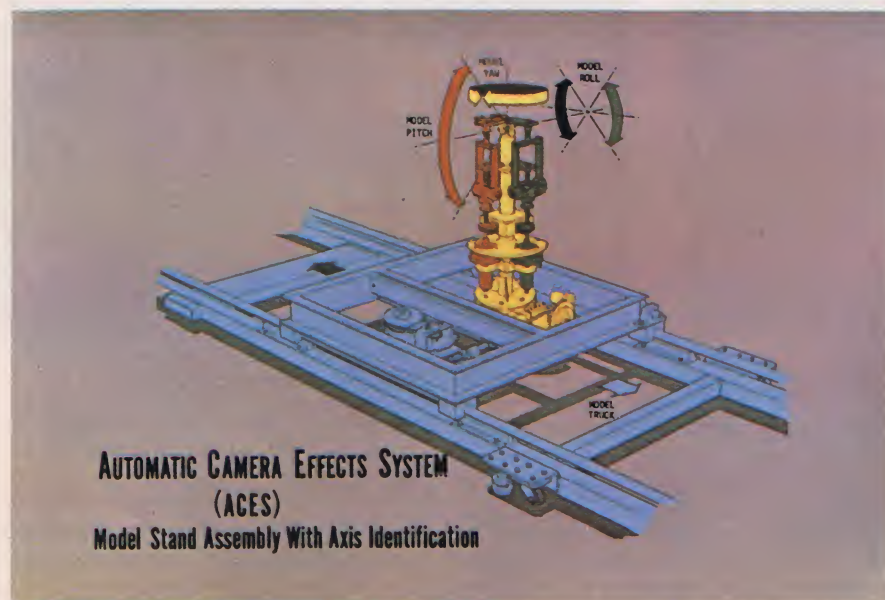
"But ACES," continues Iwerks, "isn't just a matter of recording specific moves." You can tell the computer where you want the camera and the model it is photographing to be at specific point. The computer calculates the required in-between point, moving the camera smoothly through the take, passing through up to 20 key positions at specified frame numbers. This is done for all 12 axes of motion *simultaneously* while maintaining auto-follow focus or even automatically positioning the axes to follow a point of interest during the shot! It is this calculating ability of the computer system that makes ACES so powerful a tool.

Don Iwerks describes the physical layout of the equipment. "The camera is mounted on a dolly track that is about 68 feet long. The track is mounted in the cement floor of Stage #3. We excavated the concrete floor in a channel about five or six feet wide. Then we built a new concrete foundation below the level of the stage, so we could put the floor panels back down when we weren't using it and use the stage for other things.

"The track gives us 68 feet of travel forwards and backwards. At one end of the track is a pit—the tank used for *20,000 Leagues Under the Sea*. We can rig a screen or backing down into the pit so the camera can shoot downward. It gives the same effect as having some height to the system. At the opposite end of the track is a storage room built into the sound stage. One half is very much like a garage with a roll-up door. We can back the camera right into it and close the door to

(continued on page 76)

The ACES camera crane has great flexibility of motion. Note the variety of ways that the crane can move. The roll axis allows for a full 720 degrees of rotation.



The portable model stand assembly has its own axis of movement also controlled by the computer. The model track can even be placed across the camera track.

Paul Lehr

Science fiction artist Paul Lehr is quite casual about the many fantastic spacescapes he has done over the years. When asked about the number of covers he has done for science fiction and fantasy books, he shrugs. "I guess I've done about four or five hundred."

The producer of "about four or five hundred" popular space paintings started selling his cover art back in 1958. "I started off as a still life painter," Lehr recalls. "One of the early things I did was constructing spaceships out of various kinds of materials, odds and ends—ping pong balls, things like that—and painting them in still life. I took one of the paintings to Bantam Books and they bought it—and that was the first cover."

Now he earns his living by turning out a steady stream of cover art for science fiction novels and short story collections. "Sometimes the publishers insist that you follow a manuscript very literally," Lehr explains. "Often-times they'll even give you an idea, tell you precisely what they want. I've done it sometimes from a synopsis; sometimes they have me read the whole manuscript; many times, with Berkeley, they let me do whatever I want to do just by describing the story in a general way over the phone. But most of the time I've been allowed to use my imagina-



ART © 1980 PAUL LEHR

tion to convey my feelings about the story in a more general way." He pauses. "Often I find machinery and mechanical things rather interesting and somewhat foreboding."

This feeling is aptly conveyed in the painting on the next page, "Titan," which illustrates the novel of the same name by John Varley. In *Titan*, several space voyagers are shipwrecked on what appears to be an enormous wheel which turns out to be a living organism. The heroine and her companion must scale one of the "spokes" of the wheel, brav-

ing inclement weather and other dangers, in order to uncover the secret behind the mysterious craft. When asked to describe his concept of the huge tower, Lehr thought for a moment, and then admitted, "I really don't know what the heck it is." He explained that he often bases his paintings on "visual feelings I have about the topic rather than the literal sense; although when you illustrate a story you have to satisfy the literal part of the story, of course."

"Moonchildren," shown on this page, is a much earlier crea-

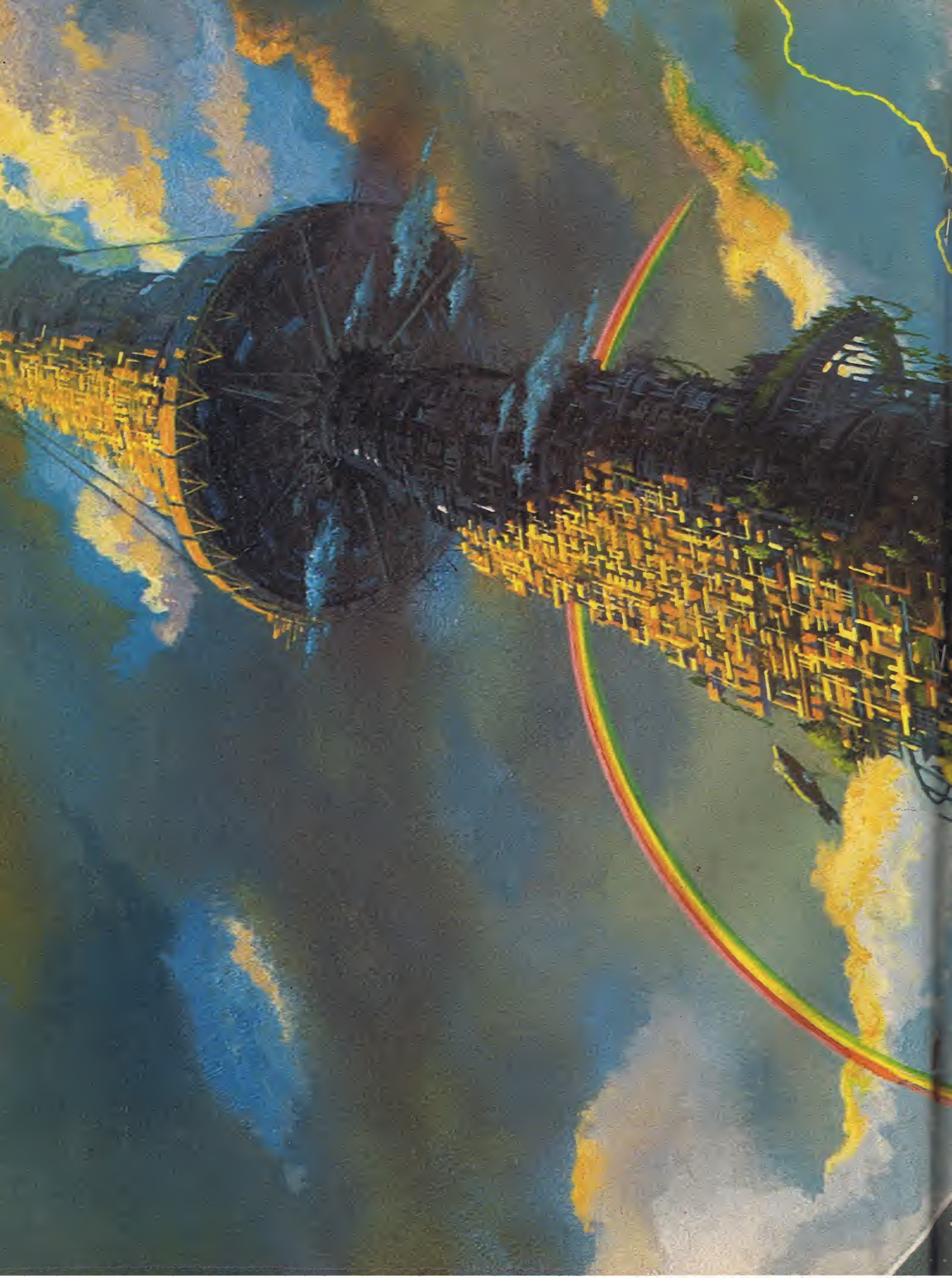
tion and, as such, the details of its genesis blend into the multitude of space art Lehr has produced. "As I remember," he says hesitantly, "it's a mechanical towering space ship with some ellipses or..." He grins. "I've forgotten really."

Paul Lehr's talents are certainly not confined to space art. He takes great pride in his sculptures; rather abstract creations made of natural elements such as wood and stone. He began sculpting seriously after moving out to a farm in Pennsylvania during the mid-'60s. "There was so much beautiful wood just for the taking—cherry wood, walnut, stone and all kinds of things—that one day I got my truck, picked up some wood and started. I love it, I've been doing it ever since."

And he intends to keep on doing it. "At this point I'm just engrossed with carving and sculpture; and I do my paintings to make a living, and also enjoy them somewhat. I'm more or less happy in that respect."

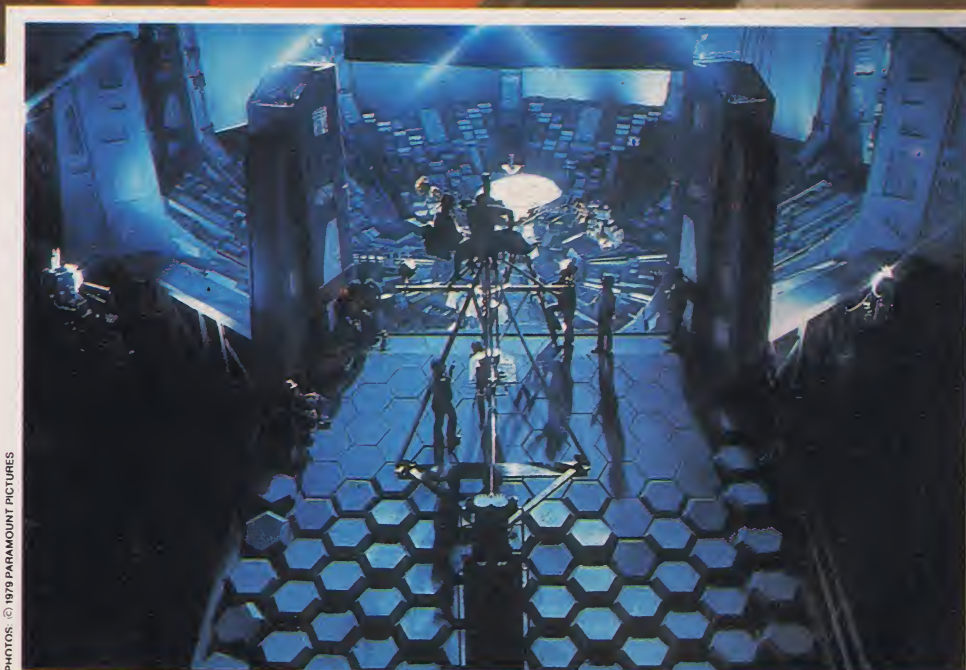
"Of course, I experiment, try other things, but some of these sculptures take me three, four, five years to finish. It's a very slow process. Especially for me—my mind is running ahead and I'm working on things that started out a number of years ago. They finally come to fruition and I'm already into something beyond that."

B





Felber



PHOTOS: © 1979 PARAMOUNT PICTURES

Above: Lee Cole's colorful Klingon consoles line the cabin background. Each viewscreen was individually conceived. Left: the hazardous V'ger set that caused injury to cast and crew members alike. The worst injury proved to be a broken back. Right: As McCoy runs a scan of Ilia, her true innerworkings are revealed on the oversized screen at the rear of the set. The effect is Cole's.



Designing the 23rd Century

Star Trek's Lee Cole translates 23rd century technology into 20th century visuals.

By ED NAHA

How do you find the bowling alleys on a 23rd century starship? What will a spacefaring doctor's office look like in 300 years?

What advances in aerospace technology will be found on a captain's bridge far in the future?

These were just some of the problems tossed at designer Lee Cole when she first walked onto the set of *Star Trek—The Motion Picture* a little over two years ago. Cole, an accomplished technical illustrator, left her job in the aerospace industry for Hollywood and was promptly asked to envision the unimaginable on her first film assignment.

"The first day we walked in," she recalls, "all they had was this gigantic fiberglass dome that was going to be the *Enterprise* bridge set. It echoed like crazy. That first day, they pointed to the dome and just said fill 'er up!"

Eventually, Cole would be responsible for not only the instrumentation design for the film but the *Enterprise's* graphics and console read-outs as well. But, in the beginning, her task concerned only the revamping of the *Enterprise* bridge. "I went out there for a two and a half week assignment," she laughs, "and wound up working two and a half years. Trying to design the instrumentation on the new bridge was pretty difficult when we first got out there because they kept on throwing out scripts. We had nothing on paper to work from.

"At that point, *Star Trek* was supposed to be a TV series. They told us to make a spaceship that we would like to have. A spaceship that would be so versatile that it could accomplish anything... even if the new series ran for another 72 episodes. In essence, the bridge had to have enough gadgetry to get through three TV seasons.

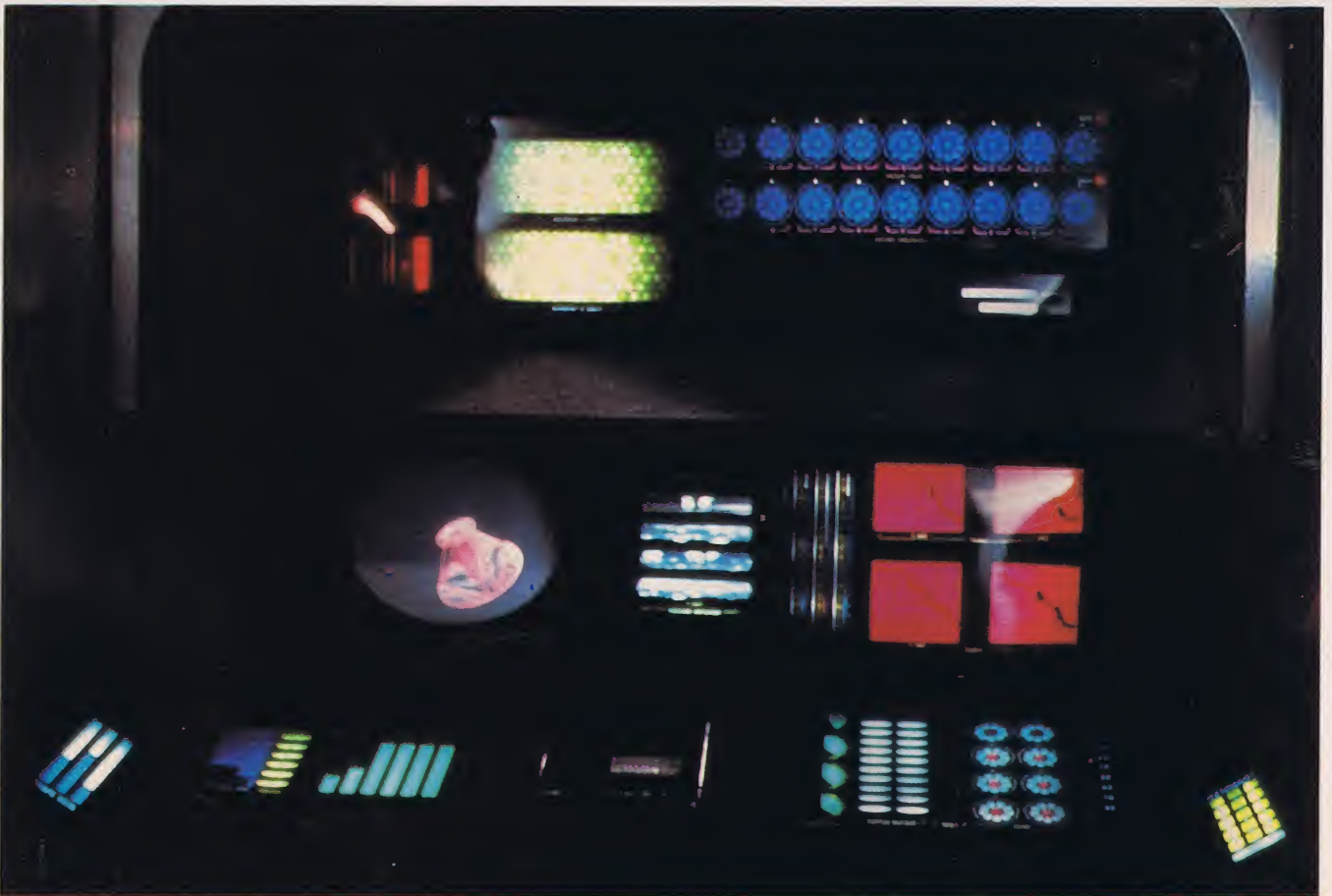
"Then they turned around and gave us an open budget. They said we could have anything we needed and that made things very difficult for us. It was like working in a vacuum. It was up to us to set up parameters to work within. When we finally got the bridge set done, I realized that if the consoles were actually hooked up to engines, you had everything that you needed to actually fly into space. Everything in front of Sulu, for instance, is the real thing.

"We did a lot of research in getting the bridge together. We talked to a lot of scientists about what advancements might occur by the 23rd century. But despite our scientific research and our contact with all these brilliant minds, we often couldn't use our findings for the film. I had originally designed the *Enterprise* consoles to be entirely smooth. They were to be heat sensitive, so a crewmember could execute his or her duties by





A myriad of Cole-created consoles for outpost Epsilon 9. The actors at right man an imaginary set-up for the camera's benefit.



PHOTOS: © 1979 PARAMOUNT PICTURES

A close-up of one of the intricate *Trek* set-ups seen, in the film, near Scott's engine room.

simply waving a hand over the console. No buttons or anything would protrude from the surface. But Robert Wise said, and rightly so, that those sort of designs just wouldn't be dramatic. In his director's role he explained that, in a really dramatic scene when Sulu's hand is grasping at this lever in an attempt to save the ship, it wouldn't be very exciting not to have a lever there for him to grasp. So, we had to violate some scientific principles in order to come up with some big knobs and levers."

Inadvertently, Lee and her cohorts Mike Minor and Rick Sternbach broke all precedents with their bridge design by using real computer systems and real instrumentation to fill the set. "All the instrumentation on the bridge was designed to actually work because we figured that, for a TV series, it would be cheaper to build sets that actually worked on their own week after week than to hire crew members to push and pull doors open and closed and viewing screens up and down constantly."

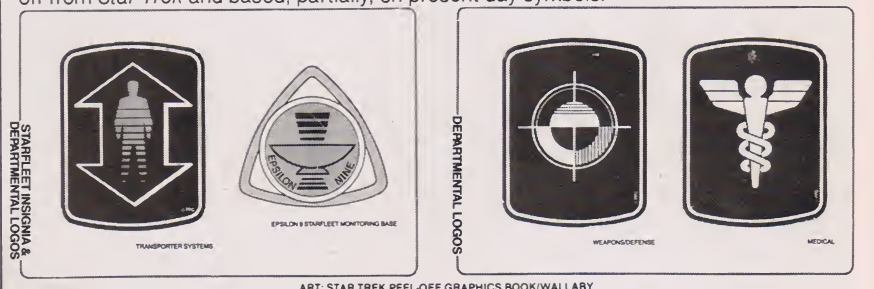
"The actors worried about having real buttons and things in front of them because if they hit the wrong switch, something would automatically happen. Even I forgot at times how real everything was. I pushed a button on a console one day, not realizing that it had been wired. Spock's unit came shooting out of the wall. It hit me and knocked me off the bridge's platform!"

Working night and day on the Enterprise bridge set, Lee encountered dozens of unexpected problems, both cataclysmic and comedic. "At one point, I almost got killed because of the bridge," she states. "We built a prototype console that we were going to cast the other consoles from. The original model had to be perfect. I came to the studio early one Saturday morning to check on the prototype which had just been completed. I brought along a tape measure and pad and pencil. The works. I went into this little room where the console was sitting and I was in the process of finding small flaws when I realized that it was boiling in this room. I was at the point of passing out from the heat when I realized that I was standing in the oven where this console was hardening. I figured I had a few seconds to get out before I became a great big cookie lying there. I figured that the studio would be fairly nonchalant about it all. They'd put a raisin in my navel and say 'Well, she gave her life for *Star Trek*. Chalk up another one and send her out to the conventions.' I got out of there just in time."

Not all of the surprise events concerning the early days of the film were death-defying. Some were delightful. "I loved working with Mike Minor," Lee smiles. "To watch him *watching* the world is fascinating. He'd take everything and turn it upside down for design value. There came a point where we had to design the ceiling of the *Enterprise* bridge. I came up with this amorphous gyroscopic design for the middle, but we needed the rest of the ceiling. One day, the two of us were walking through the Paramount parking lot on the way home when Mike suddenly threw himself on the ground and yelled 'That's IT!'



Above: Lee Cole at work on the Paramount lot. Below: some of the futuristic designs spun off from *Star Trek* and based, partially, on present day symbols.



He's on the ground on one shoulder, scribbling on his note pad. A small crowd gathered because I supposed it looked like he was having some sort of seizure. He was copying down the hubcap design of a Cadillac sitting there. Just then, the car pulled away and almost ran him over. The finished design of that hubcap is now the ceiling of the bridge set. To me this epitomizes the creative mind."

Lee and her companions moved from humanoid designs to Klingon construction when they discovered that, for the *Trek* film, the interior of the Klingon cruisers would be seen in detail for the first time. "I think that the Klingon ship is the most breathtakingly beautiful set. Those displays onboard the bridge are like Christmas to the tenth power. We littered the back with fiber optic displays and edge-lit plastics mixed in with a lot of neon. We tried to make their ship look like the product of an entirely different type of technology. It was wired totally differently than the Enterprise sets."

"I worked in some capacity on all live action sets. The V'ger set was the most difficult and time consuming. A huge amount of per-

sonnel worked on that to get all the light effects done from below. As you know, V'ger is this alien *thing* that plays host to some of the *Enterprise* crew during the film's finale. The set was titanic. It was elevated and designed like a large bowl. People were sliding all over the place.

"It was really hard to both construct and work on this set. In fact, the only accidents we had on the movie were centered around the set. One young carpenter fell from the scaffolding and broke her back. Other people tumbled through the backlit windows. We had wind machines and light effects going on constantly in there. Stephen Collins had an eye injury and Persis Khambatta went temporarily blind. It was frightening."

Aside from doing physical work on the sets, Lee had to come up with a series of signs and designs that would let crewmembers (and movie audiences) know exactly where they were on the ship. Signs that, in a simple visual design, would state that a hallway led to the medical quarters, transport room, etc. "I designed the graphics for both the ship and

(continued on page 81)

STALKING THE



A flying saucer in Wabasso, Florida. Made in 1969 from scrap sheet metal and electrical parts, it was intended as part of a UFO series.

A photographer discovers that some of the spaciest events on Earth occur right in your own backyard.

Doug Curran is looking for stray flying saucers and rocket ships. Although that sort of occupation may lead one to suspect that Curran is the hero of an upcoming science fiction film, the 27-year-old photographer is actually an ordinary fellow who has discovered and is now researching a most extraordinary phenomenon in contemporary society . . . real life



A real attention-getter in Giles Bend, Arizona is the unidentified flying neon object designed to pull in passing motorists.

WILD ROCKET

people are constructing real life spacecraft. In their back yards. On their front lawns. On canvas. Atop motels. Rocketships. Space wheels. Flying saucers.

Curran discovered this modern day space connection quite by accident during his days as a student in Toronto. While on vacation a few years back, he spotted a homemade rocket ship. He took a photograph of it. Later, he found another rocket and then another, and another. "It seemed too much to be just a coincidence," he recounts. "I felt that there had to be some reason for it. Now I see the whole thing as a historical and literary project."

Curran began stalking the wild saucers across Canada and America. Receiving fund-



A Los Angeles, California construction, this rocket was built in 1953 and remains immovable in the midst of an ever-changing environment.



Built in Apache Junction, Arizona, this massive rocket ship sits at the edge of Highway 1, visible as you drive through town.

STALKING THE



This flying saucer was erected in Oakland, California by the local Jaycees. It's "dedicated to imagineers, young and old."

ing from the Canada Council, Curran dubbed his hunt "In Advance of the Landing—Folk Concepts of Outer Space." For the past four years, camera in hand and car motor revving, Curran has sought out and snapped countless homemade craft ranging from saucer-shaped playground rides constructed by the citizens of Oakland, California to a full-scale rocket built by a Michigan religious group who believed it would take them to Heaven.

Curran doesn't see the backyard spaceship movement as a necessarily oddball phenomenon but rather as a positive aspect of today's culture. "There is a general feeling that we're a lost society," he says. "That we've divorced ourselves from the church and from tradi-



In Houston, Texas, a used car lot takes its customers out of this world with a little help from this titanic spacetarar.

WILD ROCKET

tions. I think this space connection shows that there is still that continuity in society. And *that* is both reassuring and important. People aren't standing at the edge of the world. They're still looking ahead."

On the road nearly six months out of the year, Curran has thus far logged nearly 100,000 miles in his quest. On the following pages, Doug offers some of his more outstanding finds. Still traveling and still seeking spacecraft, Curran would appreciate any new leads that could be provided in his search for undiscovered ships. Any FUTURE LIFE reader with relevant information can reach Curran at 606½ 9th Street South West, Albuquerque, New Mexico 87102.

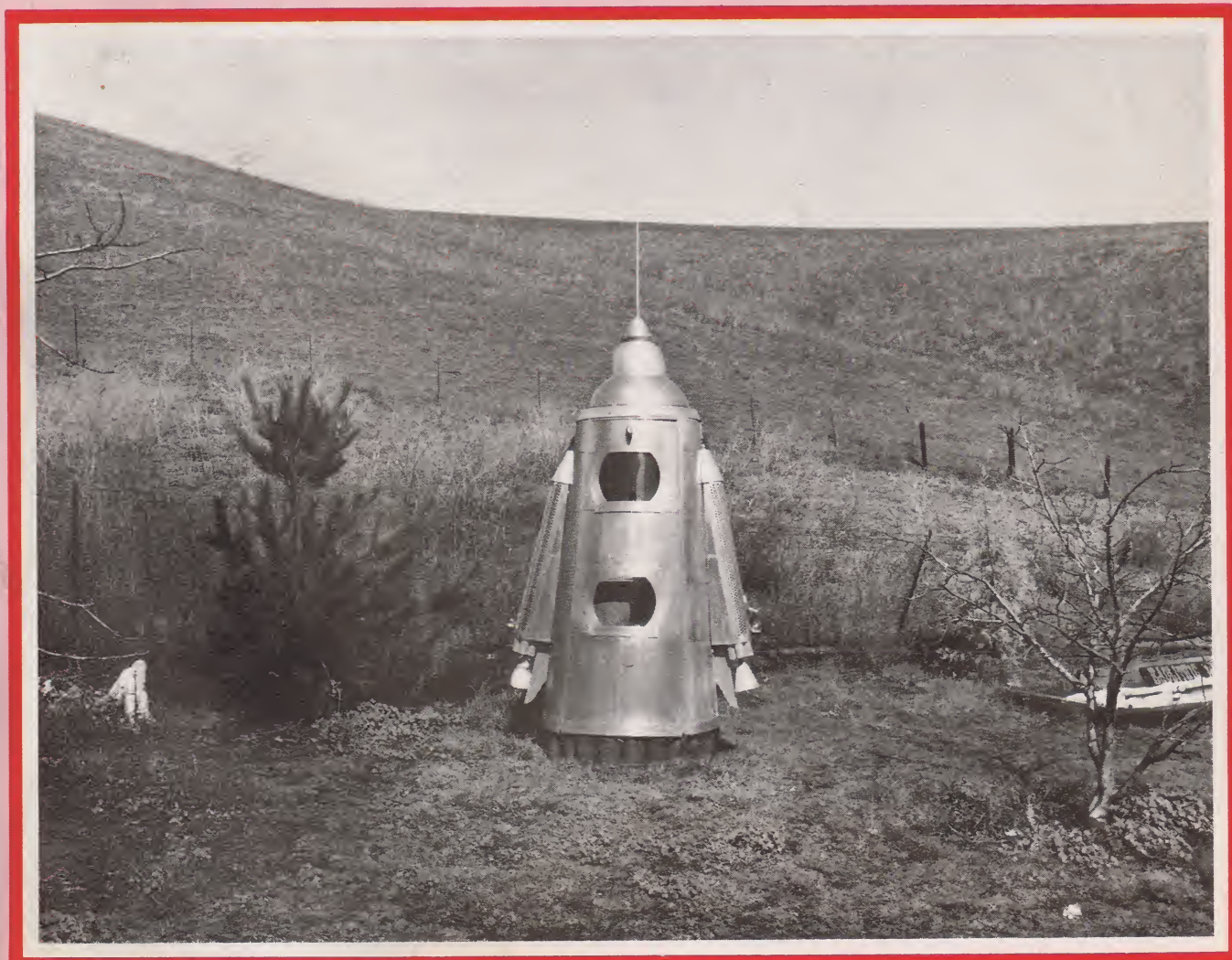
Only terrestrials need respond.



PHOTOS © 1980 DOUGLAS CURRAN



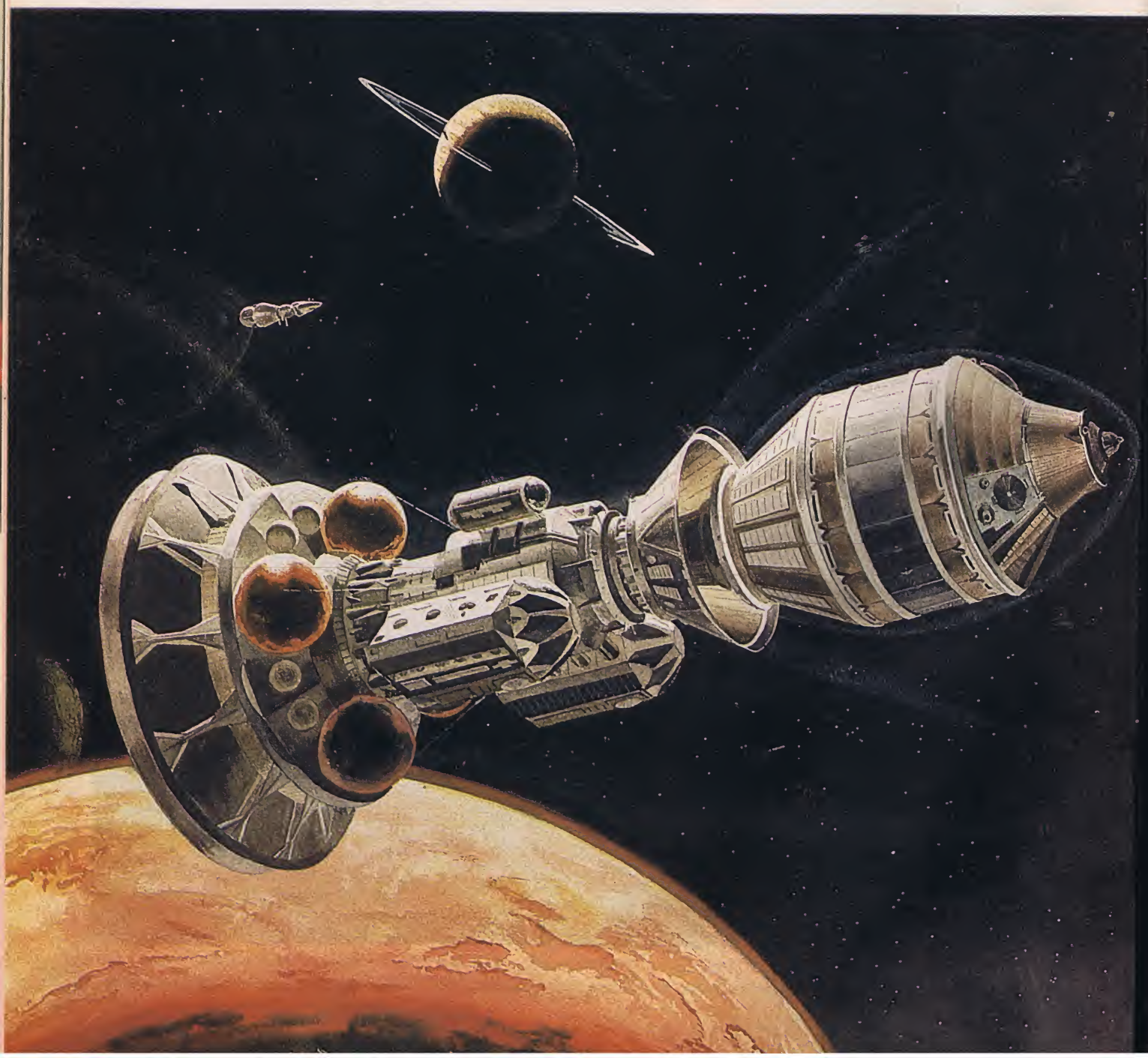
Carl Grandeu of Redding, California, painted this scene predicting an encounter between an Earthly commercial airliner and a mothership.



Clayton Bailey of Port Costa, California, constructed this "alien" ship in his backyard using toss-off equipment culled from aerospace junkyards.



ART SEIJI KYOHARA, COURTESY HUGHES RESEARCH LABS



Real Starships

The Truth About Interstellar Travel in the Near Future

By DR. GREGORY MATLOFF

We have grown accustomed to watching Captain Kirk and his fellow fictional space travelers nudge their starships matter-of-factly through warp space, cleaving the light years with the same ease that we navigate our superhighways. But we still wonder whether the stars will someday be reached, or if they

will be forever beyond our grasp.

Although few scientists will grant the likelihood of faster-than-light travel, a whole pantheon of star drives appear possible, and some are even approaching feasibility. Depending upon how much effort and money we are willing to spend, star-to-star flight times of millenia, centuries—or even



ART SEIICHI KIYOHARA, COURTESY HUGHES RESEARCH LABS



ART SEIICHI KIYOHARA, COURTESY HUGHES RESEARCH LABS

Left: A colony-sized starship sets out from the orbit of Saturn's moon Titan. The ship is powered by a Bussard ramjet which scoops up its fuel—hydrogen—from the interstellar medium.

Top left: A Daedalus-type starship, powered by a series of pulsed fusion explosions.

This page, top: A "Golden Globe" minimal weight interstellar probe, as proposed by Robert Forward, begins its descent toward a planet of a distant star, maintaining communications contact with a faraway Earth base.

Above: Another version of the Bussard ramjet leaves the Earth-Moon system.



Forward's concept of a laser beam propelled interstellar sail spacecraft.

decades—seem achievable.

However, instantaneous star flight a la *Star Trek* seems out of the question to most interstellar researchers. Generating the tremendous gravitational potential required to warp space seems to be even beyond the antimatter technology of Captain Kirk and Mister Spock. If natural cosmological space warps exist perhaps we could use them instead.

Soviet cosmologist Nikolai Karkashev has considered pairs of black and white holes, or worm holes. Certain highly restrictive trajectories might enable a starship to safely enter the warped space near the very massive and physically small collapsed star that constitutes a black hole.

According to some solutions of Einstein's General Relativity equation, a ship entering a black hole may emerge in a different portion of our universe through a still-to-be discovered portal called a "white hole." Un-

fortunately for galactic empire fans, however, we do not know when or even where the starship would emerge. The duration of the transfer is uncertain, as is the condition of the ship and its passengers on arrival. Particularly unsettling is the suggestion of some scientists that worm holes are intrinsically unstable and the first few ship or astronaut atoms to traverse the hole might destroy the worm hole forever (if "forever" has any meaning in warp space).

Perhaps the eventual discovery of a black hole near the solar system will enable us to perform certain experiments leading to improved human understanding of gravity warps. If so, the first people down the hole will probably not be astronauts but rather mass murderers attempting to redeem themselves and work off their sentences!

Leaving the space warp and instantaneous interstellar travel to the science fiction writers

for the moment, it is useful to review starship concepts that might materialize during the next few centuries. They break down into three types: generation starships taking 100 to 1,000 years to reach their destination; fast starships that require 10 to 100 years; and relativistic ships that travel for less than a decade and travel so close to the speed of light that time dilation substantially reduces travel time, from the crew's point of view.

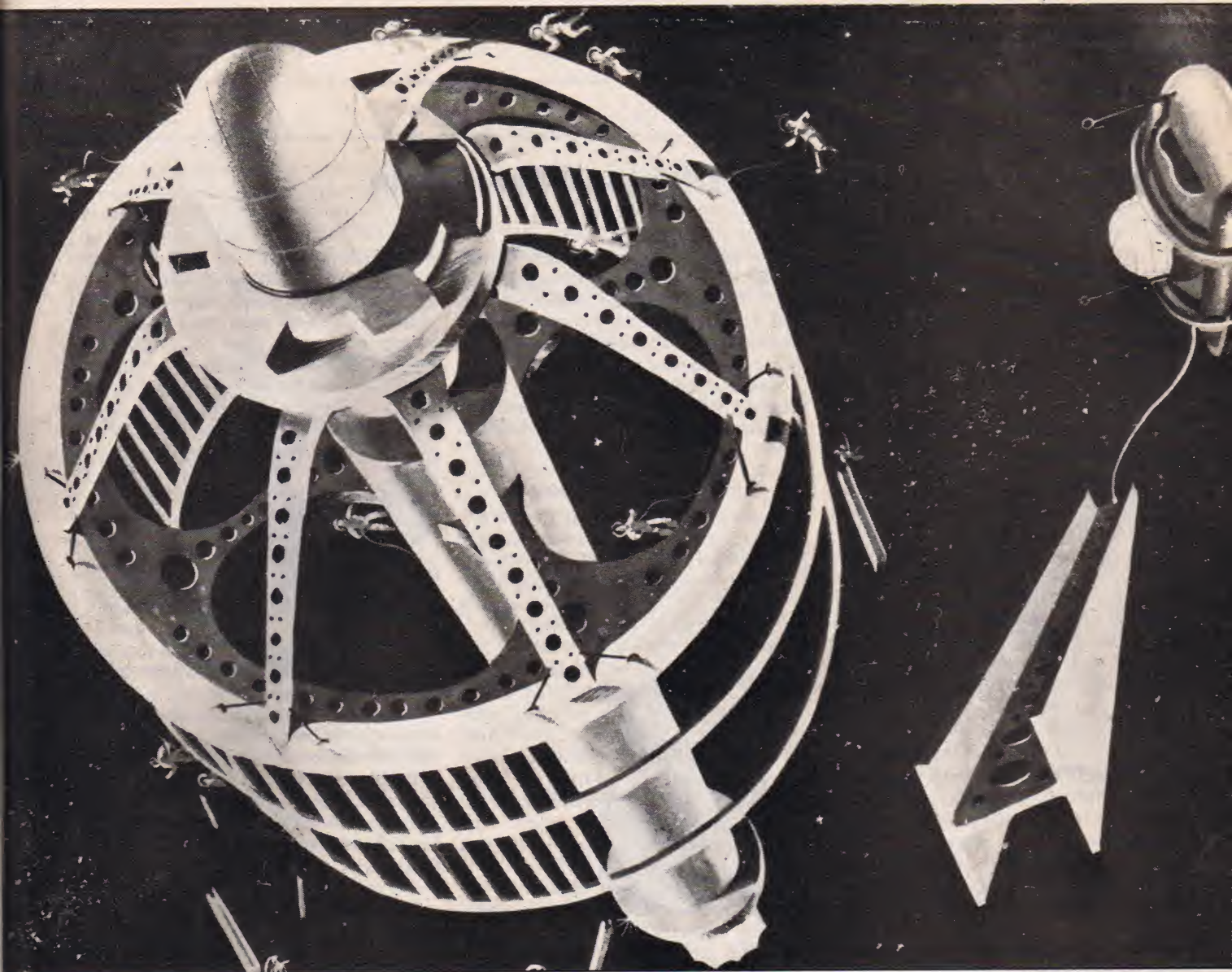
Possible interstellar missions take a variety of forms: Unmanned craft might be simple ballistic probes, flying quickly through the target planetary system, with their cameras and sensors running at full speed. Or, using retro-rockets or electromagnetic/electrostatic "drag brakes," an unmanned probe might establish an orbit within the target planetary system. The orbiting robot might search for life, dispatch Viking-like landing probes or even wait patiently to respond to radio signals generated by an alien civilization within the target system. Craft with human crews might be relativistic two-way scouting ships, or one-way colony ships designed to establish terrestrial lifeforms within the target system, or even terraforming expeditions, equipped to modify the atmospheres and hydrospheres of planets within the target planetary system, to make them more amenable to our form of life.

Early considerations of interstellar flight by the scientists Tsilkovsky, Goddard, Bernal, and Sheppard, and science fiction writers Stapledon and Heinlein considered the generation ship, the so-called "1,000-year Ark." Such a ship is relatively straightforward. Using nuclear or solar engines combined with planetary swingbys (gravity whips), the ship leaves the solar system with a velocity sufficient to carry it to a nearby star within a few centuries. Several billion miles from the target star, engines are fixed in reverse or "drag brakes" are deployed and the ship settles into orbit as an artificial asteroid. The generation ship, at least in theory, is equipped with all the amenities of home and provides a comfortable and stimulating environment for its generations of inhabitants. In practice, however, the sociology of the generation ship could provide problems for Earthlings. Few human societies have achieved both stability and creativity for more than several centuries. If generation ships are the way to the stars, Earthlings might prefer to spend the flight hibernating. If not, second or third generation inhabitants of O'Neill style space colonies might find it easier to adapt to life on a starship.

The first starship of terran design that had any chance of working was a generation ship. Ironically, Project Orion, which could have propelled life into habitats where it could not have naturally evolved, was based upon the greatest weapons of mass destruction known to humanity. Designed by Freeman Dyson and Ted Taylor, Orion would move through space pushed by the detonation of megaton-sized hydrogen bombs. Orion's flight time to the nearest star, Alpha Centauri, would be 100 to 1,000 years; the cost would be comparable to the U.S. Gross National Product.

ART: SEICHI KUYOHARA, COURTESY HUGHES RESEARCH LABS

ART: THE AUTHENTIC BOOK OF SPACE, COURTESY RON MILLER

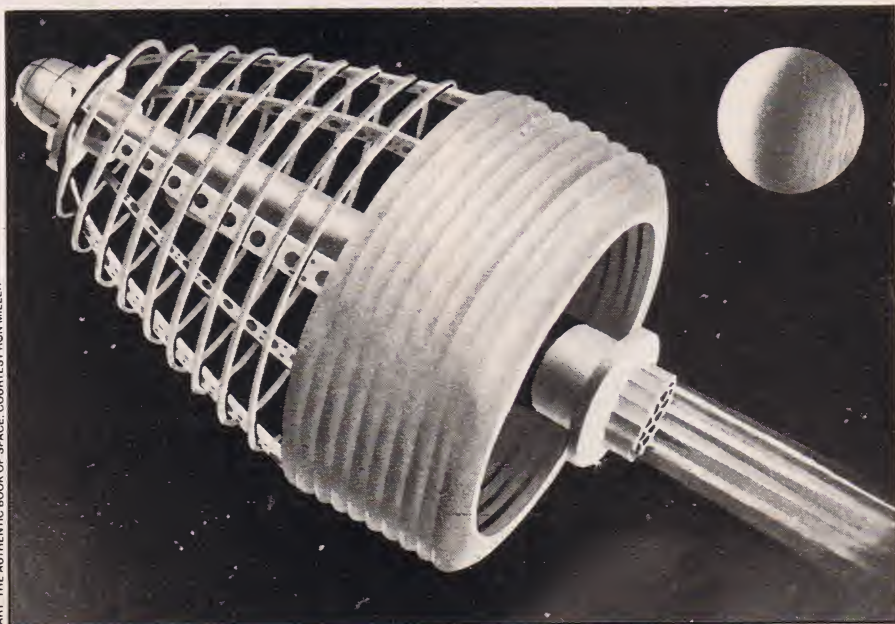


Orion was technologically obsolete long before it could be built, doomed by advances in controlled fusion research. A much more sophisticated concept is Project Daedalus, a fast fly-through probe that has been designed by a British Interplanetary Society team led by Alan Bon and Anthony Martin.

Powered by electron-beam or laser ignition of helium 3-deuterium micropellets, Daedalus could propel a Skylab-sized payload to 12 percent the speed of light, about 20,000 miles per second. At such velocity, the six light year (36 trillion mile) distance to Barnard's star could be breached in less than 60 years, and a trip to Alpha Centauri would require a 35 year journey.

Because of the rarity of helium-3, Daedalus would require very extensive support facilities. Unless we are willing to pepper the surface of the Moon with breeder reactors to create sufficient reserves of this isotope, we will be obliged to either hang helium-3 mines beneath giant balloons operating in the atmosphere of Jupiter or obtain fusion fuel using magnetic or electric scoops to tap the solar wind.

(continued on page 68)



ART: THE AUTHENTIC BOOK OF SPACE, COURTESY RON WILLER

Interstellar travel is a long standing dream of science fiction enthusiasts. These 1950s spacecraft, first shown in *Authentic Science Fiction*, were captioned as follows: (Top Photo) "A Skeleton of Man's First Starship in the Making" and (Above) "The First Starship, Man's Most Ambitious Project, is Completed."

Science Fiction and Your Brain

Brain Food

One of the most interesting places you might visit this year is right between your ears, and Gordon Rattray Taylor is ready to guide you on a tour of this wonderland in the pages of **The Natural History of the Mind** (\$14.95 in hardcover from E.P. Dutton).

The tour begins with an analysis of the construction and function of the machinery—the brain. Taylor avoids the easy comparisons of the brain with a computer or telephone switchboard, because the brain he finds modern researchers studying is like no machinery we've ever dreamed of.

Here, there are 35,000 cells, each of them connected to 600 other cells, making 100,000,000 synapses in a space this big—o. These connections between the hundred thousand million cells in your head are what make you smarter than the rest of the animals—superior wiring.

The results of breakdowns in this system demonstrate more strongly than anything else that the brain is no ordinary piece of machinery. Taylor tells bizarre stories of accidents, explosions, surgery and other catastrophes which demonstrate that if you take out a chunk of the brain, it will often as not just wire around the break. Try that with your computer.

Once you can find your way around the machinery, Taylor proceeds to hunt the operator—the mind. Now many books have dealt with the brain and its functions, but they all stop short of relating the machinery to our ability to laugh or cry, feel pain or fall in love. Behaviorist rat-runners and some neurologists argue that these things that make us who (instead of what) we are, are simply side effects of the operations of an electrochemical computer. Nonsense! says Taylor. Why would such capacities evolve if they had no function?

Taylor argues his case with an incredible array of examples, anecdotes and arcana. Without making any mystical assumptions, resorting to mathematical formulae or sinister psychobabble, he convincingly states that we are the mechanical beings some scientists would have us believe.

The brain/mind is one of science's most slippery studies. Every time researchers think they've solved a problem, they discover a new level of complexity. But right now, research is entering an exciting period of discovery and insight and this book will be a valued resource to anyone who wants to understand what's going on. It's fascinating, strange and contains as many oddities as *Ripley's Believe It or Not*.

Past Perfect Paranoia

Your name is Ragle Gumm. You live in a small American town, circa 1959. Every day you play *Where Will the Little Green Man Be* Next and every day you win. It's a living.



Everything seems fine until the day things start disappearing. A soft drink stand vanishes in front of you, leaving only a piece of paper that says **SOFT DRINK STAND**; a bus full of passengers turns into a truck full of dummies. But the things that appear are scarier—a magazine called *Look* that you've never heard of, full of people you've never seen, and a telephone book for a city that doesn't exist. And it seems that somehow the fate of the world is your responsibility—the voices on the radio say so.

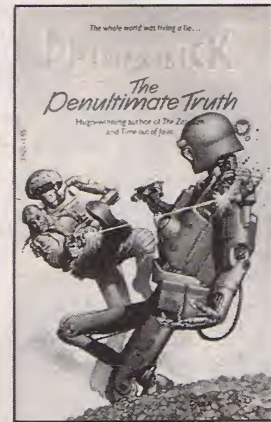
Sounds like classic paranoid fantasy, right? Wrong! Welcome to Phil Dick's **Time Out of Joint** (\$2.25 in paperback from Dell), one of three literary delusions from the acknowledged master of slightly psychotic SF returning to print in the new year.

Ragle Gumm's reality is out of socket and Dick will make you hunt just as frantically as Ragle for the clues to how and why it got that way. This is prime Dick territory where everything seems normal except for a bad case of impending doom. And it's deliciously frightening to watch him take apart his intricate puzzle of a world, giving you a chill as each piece comes away to reveal new horrors, new joys and new challenges.

In **The Penultimate Truth** (\$1.95 in paperback from Dell) Dick creates a schizoid world. Aboveground live an elite few catered by their robot slaves, while far below the surface the masses toil making robot soldiers to fight the horrible war they believe is being

waged over their heads.

You see, the war stopped years ago, but after the generals made their peace they realized what a nice world it was without all those crowds around so they just left everyone else down in the tanks. To keep everybody's head down, the generals pipe in faked war footage complete with hideous plagues and horrific super-weapons direct from their radio-



active wasteland stage set.

Nicholas St. James is the president of one of these underground tank cities and he's been forced to come to the surface to get an artiforg (artificial organ) to save the one man who can keep his city going. But when he gets up top he finds the world is nothing like he's been told and before he has a chance to get that straight, he discovers he's involved in a plot to free the tankers.

This is the story of the big lie. A lie so big that to deny it will make you crazy. And watching the lie unravel, watching the hoaxers get hoaxed, is a hypnotic trap that's as disturbing as it is entertaining.

Mr. Dick pulls out all the stops in **Clans of the Alphane Moon** (\$1.95 in paperback from Dell). Here he takes Chuck Rittersdorf, an ordinary scriptwriter for the CIA, and tosses him into the middle of a battle for the hearts and minds of the people of the moon of Alpha 11.



The only problem with this war is that everybody on the Alphane moon is crazy. Earth dumped all its psychos here more than 20 years ago, then abandoned them when they had a war with the Alphanes. Now Earth wants the moon back, but since they've been out of the wards the psychos have developed their own society and don't want therapy.

The society consists of psychotic en-

claves—paranoids live with paranoids, hebephrenics with hebephrenics and everybody's happy (except the depressives). When Earth sends a ship complete with shrink, the Pares (paranoids) are ready to lead the clans into war, the Manses (manics) to supply some superweapons and the Skitzes, Heebbs, Polys and Ob-coms are ready for whatever else is necessary.

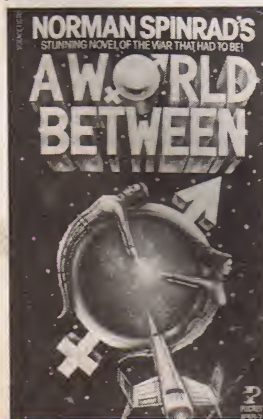
Needless to say, Chuck has his hands full even with the help of Lord Running Clam, the telepathic slime mold who's taken Chuck under his (metaphorical) wing; especially since the Earthers don't seem all that sane even when compared to the psychotic clans.

This is an outrageously funny, too-long out of print novel that cannot be summarized. The plot twists, the characters turn and the finale is a satisfyingly explosive surprise.

Chuck Rittersdorf, Nicholas St. James and Ragle Gumm are typical Dick semi-heroes. Ordinary guys trapped by incredible circumstances, they all end up completely over their heads, watching the world they thought they understood come apart. This makes Dick's books a kind of perverse pleasure to read. They make you suspect your friends, watch the news with the sound turned off and walk down the street looking over your shoulder. If you want tranquility, try somebody else; but if you enjoy getting your world shaken up every once in a while, any of these three books will do the job.

Electronic Sex War

Norman Spinrad is another author with a penchant for things pathological and in his latest novel, *A World Between* (\$2.25 in paperback from Pocket Books), he savagely satirizes the future of psychosexual war between men and women.



The planet Pacifica, Spinrad's electronic utopia, is the media center of the galaxy. It has a flourishing egalitarian democracy where men and women work and live

and love together... until it becomes the latest battleground for the opposing forces of the Pink and Blue War.

The Pink and Blue War pits Transcendental Science's logic-bound, uptight, macho male scientists against the man-hating lesbian Femocrats—with Pacifica and its citizenry of media mavens as the prize.

Combat on Pacifica is the ultimate TV ratings war. Here, if you have something to

say the Pacificans *must* give you access to the Media Web where everybody can hear you. So the Transcendental Scientists broadcast their porn operas, comedies and righteous commercials for macho manhood and the scientific method at the male of the species, while the Femocrats air their men-are-beasts horror shows and suggest that the women take over. It doesn't take long for Pacifica to lose its utopian glow.

Even Pacifica's chairman, Carlotta Madigan, and her lover and Minister of Media, Royce Lindblad, aren't immune to this poison. Their bedroom becomes a combat zone for a little while before they muster their own media blitz against the outworlders. And that's when the real fun begins.

Spinrad uses an acid touch to lampoon sex and the media, sex and violence, and sex and politics. While there's some truth to his rabid characterizations, his Femocrats are too vile and nasty to win and his Transcendental Scientists are too much like your favorite white-coated space opera heroes of yore to lose, so this leaves you sprinting through the book trying to figure out how he's going to lock the Pacificans back on top.

This is a funny, earthy, hopeful book and is heartily recommended to readers of both sexes.

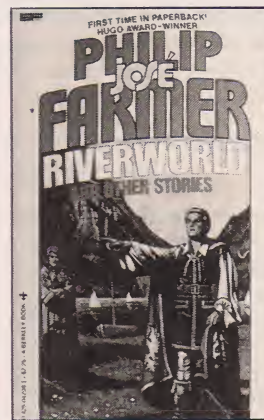
R-Rated Farmer

Science fiction readers are as obsessive as the genre's writers, and lately one of the biggest obsessions has been Philip Jose Farmer's Riverworld. Ever since Farmer introduced readers to a reborn Sir Richard Burton on a world where the entire human race has been resurrected along the banks of a million-mile-long river in the Hugo award-winning *To Your Scattered Bodies Go*, SF's aficionados have been clamoring for the next book and the next. Now, while we're waiting for *The Magic Labyrinth*, the climactic fourth volume of the Riverworld series, Farmer has taken pity and put out a balm for the seriously addicted—*Riverworld and Other Stories* (\$2.25 in paperback from Berkley).

"Riverworld," the title story, follows Tom Mix, one of the greatest American cowboys, as he cruises downriver with his latest crew—a Jewish woman who came out of Egypt with Moses (a story she tells much differently than Cecil B.) and Yeshua, the man we call Jesus. This most unlikely trio demonstrates that resurrection doesn't make all that much difference in the way some people behave, while giving us a chance for a look at a new part of the River. This is one of Farmer's "side-stream" stories, and he promises that even after the fourth volume (due out next August), he has a lot more he wants to say about Riverworld.

The other stories in this collection

demonstrate that Farmer is no Johnny-one-note. These are SF at its salacious best. In "J.C. on the Dude Ranch," he makes a divine mess of a legendary home on the range,



and "The Henry Miller Dawn Patrol" will have you looking askance at your grandparents.

When Farmer stops his irreverent battering of our saintly elders and their saintly saint, he gets serious about his heresy, taking on our mythical pulp heroes. "The Jungle Rot Kid on the Nod" is Farmer's answer to the question: What if William Burroughs had written the Tarzan stories instead of dear old Edgar Rice? Then he has Raffles, the famous thief and master cricketer of the English pulps, save the world right under the nose of Sherlock Holmes in "The Problem of the Sore Bridge—Among Others." Then there's the story of the man with the secrets of the universe hidden in his appendix, and much more.

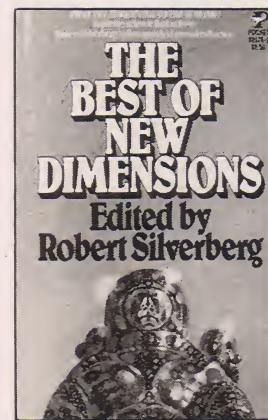
The book is fun, funny and full of enough sex, death and strangeness to keep you happy until the gentleman wraps up Riverworld.

Supreme SF

Robert Silverberg is one of SF's big guns. In the '50s, he was unbelievably prolific and as the '60s rolled by he got as good as he was fast. In the '70s, he took a look around and was dismayed at what was being called SF's best, so he decided to put out his own collection. He would pay absolute top dollar and demand the very best from his authors.

The result of this heroic undertaking was *New Dimensions*, a collection of original fiction that's arrived on your newsstands every year since 1971, and if *The Best of New Dimensions* (\$2.50 in paperback from Pocket Books) is any indication, Mr. Silverberg's authors exceeded his expectations.

The authors range from established names like Philip Jose Farmer, Ursula K. Le Guin



and Harlan Ellison to the then-newcomers Gardner Dozois, Joanna Russ, Marta Randall and James Tiptree, Jr. (aka Alice Sheldon). And *all* the stories are superb.

In "The Sliced-Crosswise-Only-on-Tuesday World" Philip Farmer offers a unique solution to the problem of overpopulation that puts a new twist on the problem of unrequited love. Le Guin's contribution is

her 1974 Hugo award-winning "The Ones Who Walk Away from Omelas," a beautiful and powerful story. Another Hugo winner is R.A. Lafferty's "Eurema's Dam," a strange little parable about creative delirium that tickles you at first—then makes you wonder. Joanna Russ and Marta Randall offer two looks at a day in the life of the future in "Nobody's Home" and "A Scarab in the

City of Time," respectively. When Silverberg put together the first *New Dimensions* he had a lot of competition from other original anthologies—*Infinity*, *Quark*, *Universe*—but he was a little more experimental, a little more open to new talent and it paid off. So if you want to see who SF's stars for the '80s are going to be, enjoy *The Best*, then watch for the rest of *New Dimensions*.

Books in Brief

The '80s: A Look Back by Tony Hendra, Christopher Cerf and Peter Elbling (\$14.95 in hardcover, \$6.95 in paperback from Workman Press). Unless you're an orthodox Disneycrucian, there's nothing too cheerful about thinking of the next decade, the 1980s. Since hindsight provides insight, however, authors Hendra, Cerf and Elbling have come up with an ideally wacky way to view the 1980s... from behind. Follow that? No matter. *The '80s* is a downright hysterical book, a fond look back at what the authors describe as "the tumultuous decade, 1980-1989." Assembling a crazy quilt of a book with all the loving care once found in the old *National Lampoon* with the scattergun humor best exemplified by the best of *Monty Python* or *Beyond the Fringe*, the threesome has come up with a truly inventive assault on the funny bone.

What events do(or did) the '80s hold? Dec. 9, 1980: The Ayatollah of Iran ordered that all foreign clocks within the borders of his Islamic republic have their hands cut off. Nov. 13, 1981: The first shipment of General Mill's *Rice Helper* arrived in Shanghai. Nov. 2, 1983: On the anniversary of its election, the Congress of Nuts voted to abolish the FBI and the IRS and to legalize cocaine and incest. May 18, 1985: A microwave beam misdirected from a solar satellite resulted in the disaster known as "The Cooking of Provincial France." Sept. 23, 1988: A new fast food chain, Grubs 'n Roots, offering "a whole third world of food," opened across the United States.

Filled with bizarre stories, off-the-wall headlines and side-splitting illustrations, *The '80s* is the funniest exercise in pseudo journalism to date. (Really, it even beats out the *National Enquirer* and *The New York Post*.)

(Ed Naha)

Glad To Be Here by Arthur Herzog (\$9.95 in hardcover from Cromwell). The publishing of this book proves, without a doubt, that there is no God. If there was one, he or she certainly would have interceded on behalf of the reader and transformed this tome into a loaf, a fish or something equally as tasty. A sequel to the mistitled novel *Make Us Happy*, *Glad To Be Here* is another excursion by

author Herzog into a new literary genre known as science fiction cutes. Set in the future, *Glad* portrays the adventures of revolutionaries Bil and Alce, Dian Toffler and ancient Ralp Nadir in their attempts to rebuild human society after the fall of the computers. Since the computers ran the world for quite some time, the foursome has a lot of work cut out for them. So do the readers.

Typical subtle satire: Bil says "When I'm president, I must remember to build new trucks, with springs. While I'm at it, I'll manufacture cars—not the top-heavy things twenty feet high that a few people have now but cars like they had in yesterages, sleek, fast jobs and use fuel as if there's no tomorrow." Heavy, huh?

Typical humor: "I also want to run for office."

"Me too," said Ralp Nadir Nth.

"Me three," echoed Dian."

After a while, one begins to long for the delicate satirical nuances once displayed by Moe, Larry and Curly. *Glad To Be Here* needn't have bothered to show up.

(Ed Naha)

The Second Son by Charles Sailor (\$2.75 in paperback by Avon). Joseph Turner is just an ordinary guy. He's very good-looking with extraordinary teeth and eyes, gives all his money to the poor, can talk people out of their problems better than Freud ever could, and has for a lover an extremely beautiful and talented prostitute. Just your ordinary, everyday hardhat.

Until he falls from a 24-story-high steel girder, survives without a scratch, and finds that he has suddenly developed miraculous powers of healing. After that, poor Joseph must contend not only with his own doubts, but with the Vatican, which is convinced that he is the second coming of Christ and wants him to assume the role with all the pomp and circumstance that it can muster; with politicians, who become annoyed when Joseph tells his new followers that they should not pay for services not rendered; and with the public, which wants to be led but isn't quite sure where.

The Second Son is a well written novel that

presents us with an interesting concept—what *would* happen if the new messiah turned up in the middle of Manhattan? Unfortunately, it also reads somewhat as if it were written by a computer programmed to produce a popular bestseller—we are given the required (discreet) sex scene and the required (not-so-discreet) violence scene; the good guys are very good and the bad guys horribly bad. But all in all, unless you are a confirmed atheist or are looking for a deep literary experience, *The Second Son* is a good story for a rainy afternoon.

(Barbara Krasnoff)

Keeping Time by David Bear (\$9.95 in hardcover by St. Martin's Press). Jack Hughes is a streetwise, jaded, but essentially decent private investigator who works out of a roach-infested office in Manhattan. He is hired by a rather shady character and, in the course of his adventures, has to deal with ambitious politicians, uncooperative police, faded movie stars and mysterious sexy ladies. Sound familiar?

Of course it does. In this, his first novel, author Bear has collected practically every time-honored cliché of a 1930s detective novel and dropped them into the year 1999. In his version of a future dystopia, most of the United States (California has dropped into the ocean) has succumbed to unrelenting apathy. Suicide is so commonplace as to have become normal, the city has been deserted by all but a few, and nothing works any more because there is no longer enough power to work it.

In this depressing atmosphere, detective Hughes sets out to find the person who stole five tapes—tapes on which are recorded, for future use, extra minutes in their owners' lifetimes. Why would anyone want to steal somebody else's time? Does the time-storage machine really work or is it all an elaborate con? Why was aging motion picture idol Gregory Darling killed, and who is the mysterious woman he spent the night with? Do we really care?

Not really—but *Keeping Time* is such a skillful blending of mystery and science fiction clichés that it is fun to follow our hero as he uncovers clues and bad guys, all with Sam Spade-like aplomb. (Barbara Krasnoff)

What role can and should science fiction writers play in working with America's major corporations in planning for the future of society?

JACK WILLIAMSON

Author of The Legion of Space, Darker Than You Think, The Humanoids, Undersea City, The Reefs of Space, The Pandora Effects and Star Bridge; president of Science Fiction Writers of America.

I do think science fiction writers have a role to play in working with nearly anybody to cope with societal change and plan for a more future-oriented society.

Science fiction writers have occasionally made sound predictions about the future,

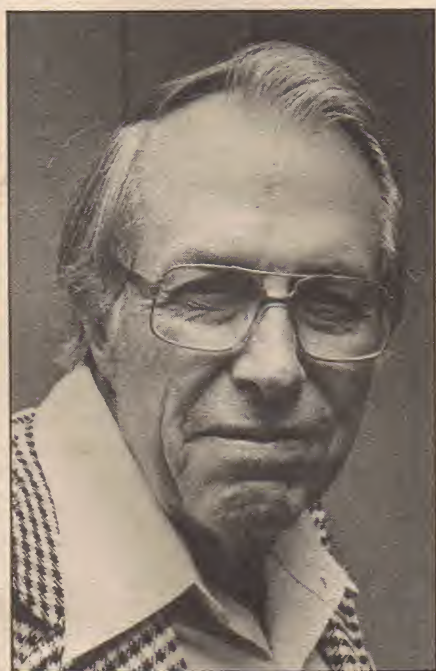


PHOTO: JAY KAY KLEIN

and I think there is a significant relationship between science fiction and futurology. H.G. Wells, I believe, was the principal shaper of modern science fiction. I believe he was also the inventor of futurology (see his lecture and book *The Discovery of the Future*, published in 1902). I think his career in both fields was largely determined by his year as a biology student with Thomas Henry Huxley. He learned Darwinian evolution, and he was a pioneer in applying it both in fiction and in the real world. In fiction, *The Time Machine* projects human evolution into the future; *The Island of Dr. Moreau* is a parable of evolution; *The First Men in the Moon* is a

somewhat sardonic look at genetic engineering. In fact, he became more and more concerned with the alarming shapes of the actual future as he foresaw it, and he spent most of his life as a practicing futurologist and a campaigner for the world state that he came to see as the alternative to world destruction.

Yet very little science fiction is written as simple prediction. For the sake of drama, the writer generally opts for the unlikely disaster instead of the more likely human triumph.

The important thing that science fiction can do is to condition our culture to accept the fact of change. We tend to fall in love with the status quo. All sorts of individuals and organizations gain a stake in it, battle to defend it, and look with dread at any event that might change it.

In fact, the world is changing under the impact of technology. Some of the changes are already history of course; many more are obvious; vaster changes to come are hardly suspected. The computer, for example, seems certain to transform our culture profoundly—perhaps as profoundly as the invention of fire or the invention of agriculture. Science fiction has looked at some of the possibilities, but hardly enough to reveal the actual shape of things to come.

For one obvious example of the way we cling to the status quo, I might mention the current debates about nuclear energy. Actually, it is—I'm pretty certain—the safest and cheapest power we can use for the rest of this century. The need is so desperate that I can't believe we'll turn it off. But if you listen to Jane Fonda and Barry Commoner...

I would expect science fiction writers to have more influence indirectly than directly on the major corporations. A few of them—some of the biggest names in the field—have been employed to speak at board meetings and conventions and to write for house organs. But I think most corporate planning ignores science fiction. We haven't entirely recovered from our generation in the pulp ghetto, and I suspect that most corporations, like most other influential or powerful institutions, are still dominated by C.P. Snow's "traditional academic culture," still ignorant or suspicious of the "culture of science." I hope science fiction can build a bridge between the two cultures. That process, I think, has already begun—but a look at the headlines will show that it still has some way to go.

JOHN VARLEY

Nebula and Hugo award-winning author of The Persistence of Vision, The Ophiuchi Hotline and Titan.

I don't really have much useful to say about the question you pose. For one thing, I don't think I can speak for other science fiction writers; many of them are sure to be eager for such a role. I can only speak for myself, and I recognize myself as only a storyteller and no kind of prophet at all. If I tried to tell major corporations or anyone at all what was coming in the future and how to plan for

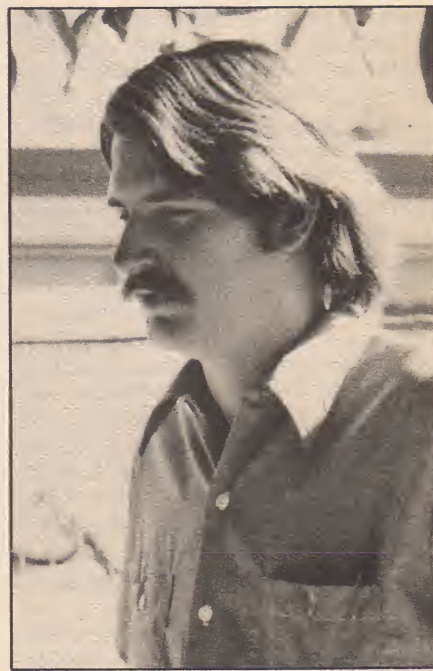


PHOTO: DAMON KNIGHT

it and how to prevent disasters and how to become more future-oriented, I would be doing nothing more than indulging in false self-importance. (I suspect a lot of the answers you get will be doing the same thing, but will at least sound better than anything I could say.)

My attitudes about the future are wrapped in extreme pessimism; I don't really believe anybody can do anything. My impulse, since you asked what *this* science fiction writer might do in working with major corporations, would be simply to tell them to stop. Stop everything you are doing now... everything. Think it all out for a few decades, and

Hogan: "Writers can contribute to promoting a sense of purpose . . ."

then start back in slowly when you think you might know what the mistakes were. I do not propose this as a rational solution. My thinking about the future is anything but rational.

OCTAVIA E. BUTLER

Author of Patternmaster, Mind of My Mind, Survivor and Kindred.

I'm not sure most science fiction writers are taken seriously enough to play any but an indirect role in influencing corporations in particular or society in general. At any rate, the indirect role is the one I will comment on.

The work of science fiction writers is writing. This does not mean their influence is limited to readers or, in the case of film, to viewers, but it does mean they must influence readers and viewers first, and influence them strongly if they are to reach anyone else. So, then, what role should science fiction writers play in helping their readers and viewers (young people in particular, whether they eventually become corporate executives, blue collar workers, scientists, whatever) cope with societal change and plan for the future? Science fiction writers should provide a kind of Madison Avenue for unfamiliar or "unacceptable" ideas. That is, ideas that need to be considered, gotten used to, perhaps adopted, but at least judged with as little as possible of fear, prejudice, ignorance, or that natural human conservatism which causes people to suspect or reject the unfamiliar automatically.

Science fiction writers can "advertise" unfamiliar ideas by including them within good entertaining stories. For instance, most science fiction writers use the metric system in their stories of the future. I doubt that this has put every science fiction reader at ease with metrics, but I haven't heard the hostility toward a metric change-over from science fiction readers that I've heard from non-science fiction people ("unnecessary, un-American, communistic!").

Familiarizing people with unfamiliar ideas eliminates at least some of the apparent alienness of those ideas. And familiarizing people with unfamiliar people eliminates at least some of the apparent alienness of those people. Science fiction has long done this with people who might or might not exist—extraterrestrials. They've done it so well that some nonfiction writers have had an easy time convincing large numbers of people that the extraterrestrials are already among us everywhere—and everywhen. Unfortunately, however, many of the same science fiction writers who started us thinking about the possibility of extraterrestrial life did nothing to make us think about here-at-home human variation—women, blacks, Indians, Asians,

Hispanics, etc. In science fiction of not too many years ago, such people either did not exist, existed only occasionally as oddities, or existed as stereotypes.

Happily, this situation has improved, especially for women, but science fiction is still not doing nearly the job it could do, and do naturally, without preaching, without proselytizing. There are still people in the genre



PHOTO: JAY KAY KLEIN

who think nothing should change. For instance, at a recent convention a writer, a pro, explained that he had intended to use a black character in a story of his, but decided not to do it because he felt that a black would change the focus of his story, make it a story of race relations. His thinking was too narrow for him to visualize a black in any other context. Moments later he found a way to eliminate blacks from even race-relations stories. He suggested blacks be represented by extraterrestrials.

On the opposite side, though, the side of the kind of advertising I'm advocating, are writers like Suzy McKee Charnas (*Motherlines*) and John Varley (*The Persistence of Vision*—the title story and "In the Hall of the Martian Kings" in particular) who portray blacks and members of other groups as exactly what they are—members of the societies they live in. People. Neither writer focused on race relations as a theme, and neither seemed in any danger of being sidetracked by their black characters. They just told their stories—Varley well enough to win a Nebula. Good writing. Good advertising. It can be

done, should be done in the hope of making some small impact on the retrogressive, fragmented present as well as on a future that could be better.

JAMES P. HOGAN

British-born electronics engineer and computer specialist; author of The Genesis Machine, The Gentle Giants of Ganymede and The Two Faces of Tomorrow.

What role can science fiction writers play? That of taking a long-term view of the future of humanity and defining the vital role that corporations must play in helping to shape that future. In doing so, writers can contribute to promoting a sense of purpose and motivation that go beyond the necessary but shorter-term considerations of profitability and corporate survival.

All too frequently the problems confronting the world today are seen merely as distorted, parochial issues that have to do with things like heating water for the bathtub or keeping the living room warm in winter. Such issues are trivial and inconsequential. The underlying problem is of a far vaster, global scale and revolves essentially around the question: Are resources finite or not, and who gets what share? Two-thirds of the human race does not generate sufficient income per capita to enjoy reasonable standards of nutrition, health, education, and so on. The advanced-sector populations are able to live the way they do because the labor that earns their wealth is performed by machines (i.e., their industrial productivity is multiplied thousands of times over). A high level of productivity can be supported only by ample supplies of energy, and when we get away from the bathtub/thermostat way of thinking and express the problem in terms of the demands per capita of a whole planet advanced to today's Western standards, that means *lots* of energy. Energy on such a scale can be provided only by harnessing to the utmost extent possible the creativity, inventiveness, and intellectual potential unique to the human species; in other words, within a framework of positive economic growth, heavy capital investment, high technology, and a massive program of technology transfer to the Third World. The solution does not lie in conservation, plateauing out into stagnation, or going back to spinning wheels and windmills.

The notion that energy is finite and is going to run out one day is absurd, but the mentality that allows such convictions to take root is positively dangerous. If the human race allows itself to believe that resources are limited, then ultimately people will squabble

Anderson: "SF keeps showing that the future is not foreseeable. . ."

over them and then fight over them—all the way down to the last barrel of oil. Eventually, when the shortages become acute enough, very probably such a war would escalate and become nuclear. So when you think it through, the only final alternative to nuclear reactors is nuclear bombs; which would the environmentalists want?

I work for a large computer corporation that began 20 years ago with three men and a capital loan of \$80,000; today the company employs around 50,000 people worldwide and has an annual sales revenue of well over one billion dollars. If, on the day the company was founded, somebody had accurately forecast the demands for expenditure that would arise over the next 20 years and asked the president how he was going to meet that out of \$80,000, the answer would have been, of course, that the suggestion was ridiculous; the company would invest its starting capital and create the income needed to pay its way. In the same way we can regard the tiny pockets of fossil fuels and easily accessible metal ores that happen to be trapped around the Earth's surface as our starting capital to float the "business." To attempt to stretch them out forever would be ridiculous. We use those as the investment to build up the technological and industrial base necessary to develop the higher forms of energy-yielding methods such as nuclear fission and fusion, and to get off the planet and eventually out of the solar system to realms of virtually inexhaustible resources of every description, thus opening up limitless possibilities. If that move is not made when the time is ripe, and a zero-growth, conservation policy is allowed to take hold, then eventually that starting capital will be used up and civilization will collapse all the way back to the Stone Age. After that it could never again arise since the fuel and other resources needed to make the first step would be gone. Maybe across the galaxy many emergent civilizations have reached that point and gone into decline because they ran out of courage and vision at this critical juncture. Einstein showed that the physical universe must be dynamic and either expanding or contracting; it can't exist in a static condition. It's the same with society in the long term.

A more way-out thought follows from the prevalent belief among scientists today that there are almost certainly many more worlds inhabited by intelligent species, and that sooner or later we will collide with some of them. The history of evolution and the vastness of the universe teaches us in unmistakable terms that nature does not have any "favored children"; with successive advances in scientific knowledge, first the Earth, then the sun, and now even the whole

galaxy have been deposed from their privileged positions as centers of the universe and rendered totally insignificant. The lesson has been spelled out time and time again that a species that allows itself to drift into stagnation is ruthlessly extinguished when it encounters a more advanced kind. Which would we prefer to be? To gain a niche in the survival stakes, you have to get better all the

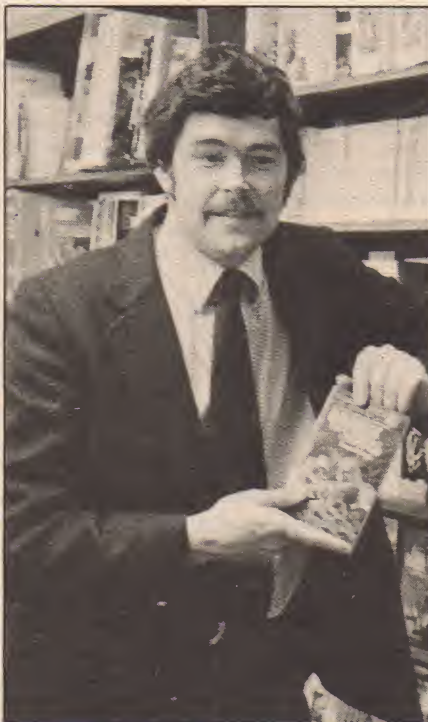


PHOTO: PHILIP A. STICK. REPRODUCED BY PERMISSION OF BALLANTINE BOOKS

time; those that are overtaken are destined for oblivion. The human race must gain its niche by its own efforts and its own abilities; there are no benign "big brothers" in the sky watching over us to lend a friendly hand or magical, mystical agencies operating to solve our problems for us.

The future of humanity therefore hinges on its confidence in science, technology, and national thought as the only solution to its problems, and in establishing this confidence the corporations can play a leading role. This is especially true in these days of disenchantment with political leadership. Political leaders are too sensitive to the whims of electors, and electoral whims have shown themselves to be the most fanatical and least informed elements in society. The corporations can provide a desperately needed sense of purpose and direction by standing for and identifying with our longer-term destiny. Be profitable and survive, of course, because that's what the interests of both shareholders and employees depend on, but let that survival be seen as a means of contributing to a greater end that has meaning rather than an

end in itself.

Why? What's in it for the corporations? Traditionally, the American has been motivated by the feeling that the job he does, his life, his work, and his existence had a purpose beyond a weekly paycheck to pay the rent; he was part of an outfit that was going somewhere that meant something. That was what transformed this country in a couple of centuries. It seemed to come to an end with Apollo. Since then people have come to feel a sense of purposelessness and frustration. Many corporations today are experiencing problems with motivation, finding that the traditional carrots and sticks don't work as they once did; more and more, status symbols and prestige attract mediocrity and leave the talented indifferent or cynical. But the feeling of contributing to something that *matters* is still one of the strongest motivators known, and genuine enthusiasm can only result in better salaries, higher profits, and improved satisfaction all-around. Thus serving the long-term, more idealistic need would have a direct and beneficial effect on more immediate goals too, which has to be the basis of a good deal.

POUL ANDERSON

Author of The Earthbook of Stormgate, Tau Zero, Beyond the Beyond, The Byworlder, The Star Fox, Trader To The Stars, A Midsummer Tempest and A Circus of Hells.

Offhand, I doubt that there can be any such role. While individual executives may occasionally be interested in science fiction, the big corporations are run by bureaucracies with little or no more collective imagination (or guts) than the government. Companies do nowadays consult "respectable" futurological outfits such as the Rand Corporation or the Hudson Institute, and these may in turn solicit the opinions of a few writers on the q.t. But isn't that about the maximum extent of it?

I'm not even sure that anything further would be desirable. Science fiction writers have no more of a pipeline to the future than does anyone else, and are apt to have less exact information than specialists do. We brag a lot about having used such themes as atomic theory and spaceflight from the start, but I don't know of a single story which came anywhere near matching the course of real events in those areas. And did any writer foresee, say, the transistor, with all its implications? On the contrary, our characters were still using slide rules, hundreds of years from now!

Does science fiction have any social value,

Niven: "Science fiction writers don't take orders worth a damn."

then, beyond being entertainment and perhaps, in a small way, helping keep a degree of literacy alive in this country? Well, yes, I would say it does. Among other things, by its own multifariousness it keeps showing that the future is *not* foreseeable, is certain to be full of surprises. As Ben Bova has remarked, it can play with wild cards—for example, contact with an extraterrestrial civilization—that are simply not allowed to the professional futurologists. Thus, in however shadowy a fashion, it does sketch out alternative scenarios, and keep its readers aware that predictions are seldom fulfilled.

Of course, this does not mean that careful, professional extrapolations should not be made and taken into account by those responsible for the planning of important undertakings. In fact, one of the few encouraging things I see these days is that the directors of public and private corporations are doing so, rather than drifting along quite blindly.



RICHARD A. LUOFF

Author of One Million Centuries and Space War Blues.

Having spent a couple of years in a rather civilian-dominated army headquarters job, and then having spent 12 years in a business environment where "cutting edge" technology was an everyday concern (i.e., computer development), I'm surprised and pleased that your question has to do with influencing major corporations rather than government. From all that I've seen, government is not only monstrously inefficient and slow-moving, but hopelessly *short-sighted*, and what we need is *long-sighted* leadership.

Not that I want to paint all of business in sparkling colors, either. There are more examples of heartlessness, greed, inhumanity, and both narrowness and shortness of vision in the business world than you can shake a printout at. Just a couple are the use of environment-damaging and cumulative insecticides, and the stubborn clinging to environmentally harmful and non-renewable fuels when clean and self-renewing power sources are readily available and requiring only investment and development to become commercially practical.

In 1933, Frank M. Kelley had a story in *Amazing* ("Into the Meteorite Orbit") predicting that the African nations would become a dominant bloc by covering vast regions with solar collectors and offering the power to an energy-hungry world when fossil reserves ran low!

People are always repeating that science fiction predicted this or that technological development, from the submarine and the airplane to nuclear power, television, computers, and organ transplantation. What is less often noted is the fact that science fiction has predicted every major world problem of our century: overpopulation, pollution, energy shortage, nuclear accidents, declining literacy, deteriorating quality of life, and so on.

The problem is, nobody would listen!

A secondary problem is that, even if people in positions of influence *wanted* to listen, they would hear not a clear voice but an incoherent babble predicting everything from utopia to disaster, laying out uncountable problems and innumerable—even conflicting—solutions to those problems.

What I'm saying is, even if the president of General Motors, no less the President of the United States, said to the science fiction community, "All right, lay out for me the biggest problem that you see for the next 25 years, and the best and most practical solution to it,"—there would be 50 or 500 answers! How

would that president know which one or ones were of value?

There is the "new science of futurism" that we hear of nowadays. Perhaps I'm being unfair, but I must say that what I've seen of the "futurists," especially of their publications,



has not been very impressive. More drab academic publications are not what we need.

It thus looks like a hopeless situation—but strangely enough, this problem which we seem unable to solve (giving the chief executive officer of each of the *Fortune 500* corporations a free subscription to *Galaxy* won't accomplish much, believe me!) may not need us to solve it. The problem may be solving itself.

Science fiction has made major inroads on college campuses in recent years. Where "that nutty kid who reads Buck Rogers stuff" was once regarded as a harmless eccentric at best, he or she is now seen as the mainstream of collegiate literary life. Stepping down to high school, junior high school or "middle school" levels, the phenomenon is even more striking. I recently taught an evening course in science fiction at the College of Marin, and a high percentage of my students were librarians and English teachers from the high school and advanced elementary school level.

I asked the students why they were enrolled in my course, and again and again and again they told me the same story. "The kids today simply will not read *anything*—most of them. But the ones who *do* read don't want to read anything but science fiction. We're here to learn about science fiction so we'll know what books to recommend and to stock, which ones to avoid, and so on."

Lupoff: "It's up to us... to point out real problems before they arrive."

It's no surprise to state that the major leaders of large corporations are people who are willing and able to read. And if the only school kids today who are willing to read, read only science fiction....

They read our stuff. It's up to us to provide them with books that point up real problems before they arrive, and that offer sound and humane responses to them. These leaders are hungry for ideas, and they are coming increasingly to us to get those ideas.

As for more direct and elaborate collaboration between science fiction writers and corporate leadership—I'm not sure that that's really in the cards. I certainly don't know how to go about setting it up. We can plant ideas, but the actual decisions of corporate leaders are generally based on hard-headed factual considerations, mainly economic considerations. At least, that was my observation of five years at Sperry Rand and seven years at IBM.

ROBERT ANTON WILSON

*Futurist Wilson is the president of the Exo-Psychology Institute, director of the Prometheus Society and vice president of the Institute of the Study of the Human Future. With Bob Shea, he wrote the *Illuminatus!* trilogy, and he is the author of *The Cosmic Trigger* and *Schrodinger's Cat*.*



PHOTO: DANTE NOTO

It seems to me that corporations (and governments also) will increasingly need to hire futurists as consultants, as routinely as they now do with other social scientists. That is, futurism—the art and science of extrapolating *alternative* future scenarios—will

become one of the most important social sciences for all persons in decision-making positions.

Science-fiction writers will play a role in this because there is continuous feedback between science fiction and future studies. Most futurists I know read science fiction and are influenced by it; and most science fiction writers read futurist books and magazines and are influenced by them. In addition to this, many science fiction writers are also active futurists.

Science fiction, because it is a form of literature, "fleshes out" future scenarios in a way that the best expository science fact writing simply cannot do. For instance, any corporate body trying to comprehend what longevity means would learn many important things from recent science fiction. They could learn, say, the state of current research and what can be expected in the next 10 to 20 years from a factual book like Rosenfeld's *Pro-longevity*; but to get a feel for the social and psychological consequences of longevity, they would do better to consult Harrington's novel, *Paradise One*.

In other words, if a corporation asked me right now to recommend a panel to brief their executives on the longevity revolution, I would recommend not just several leading researchers, such as Drs. Segall, Strehler, Comfort, etc., but also several science fiction writers who have vividly imagined the social upheavals that might result, such as Harrington, Heinlein, Simak, and Bester.

LARRY NIVEN

*Hugo Award winning author of *World of Ptavvs*, *A Gift From Earth*, *Ringworld*, and, with Jerry Pournelle, *Lucifer's Hammer* and *A Mote in God's Eye*.*

It isn't to be expected that writers will work well with other people. It can happen, but don't expect it. Science fiction writers in particular live in worlds of their own. Even those of us who collaborate, demonstrating an ability to work closely with *one* other person can't necessarily work with a corporation.

Remember the first season of *Star Trek*? Several science fiction writers of known competence were persuaded to write scripts. Their shows were the best of the lot. But the writers then dropped out. Even the money (fantastic!) wasn't enough to compensate for the drawbacks: other people of lesser talent mucking with their precious prose.

So the relationship will be loose.

First, corporations can make serious efforts to keep the science fiction field informed of what they're doing. This could be done in

cooperation with the Science Fiction Writers of America. Or, Jerry Pournelle has been acting as liaison with the Jet Propulsion Laboratories (JPL) and other outfits. (JPL saw to it that a bunch of us watched the Voyager encounters with Jupiter. In contrast, NASA saw to it that a science fiction writer had to demonstrate that he was a newsman if he was to watch a Saturn Moon rocket launching. I've always thought it should have been the other way around: a newsman should have had to show at least one published science fiction story....)

We do our damndest to predict a probable future, problems and all. The corporations are shaping our futures. They can tell us how.



PHOTO: JAY KATHELEN

Second, our part is to write. Today's world society is as future-oriented as any that has ever existed. Science fiction must keep us that way. Even bad science fiction, even anti-technology science fiction, carries the basic message: that times change.

Don't even consider our obligations to the corporations for their efforts. Science fiction writers don't take orders worth a damn.

Third, the reverse? Corporation personnel may feel free to read science fiction; to learn from cautionary tales; to fall in love with a lunar mining scheme, and to try to make it become real. Robert Heinlein was writing about mass drivers (called "linear accelerators" or "electromagnetic cannons" then) many decades ago. Arthur Clarke wrote of communications satellites in geosynchronous orbit....

This too is a loose relationship. We don't expect a corporation to take orders from us. But we'd love to have a hand in shaping a better future.

STARLOG TRADING POST

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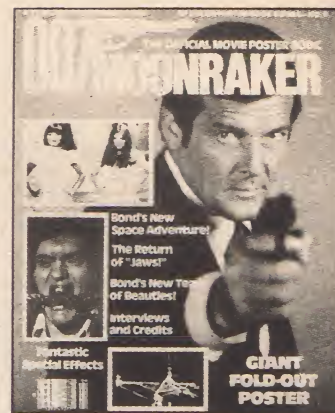
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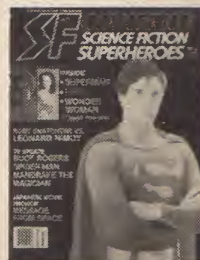
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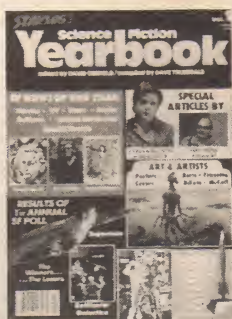
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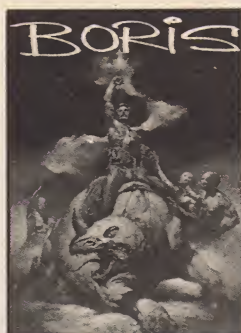


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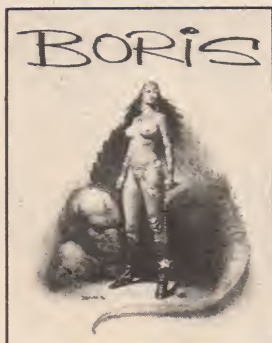
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High Orbit: The Colony Papers

In the early days of the space colony idea, my husband Keith was lecturing to a group of college students. One of them asked him, "What are the colonists going to do for paper?" Keith, a computer freak by occupation, launched into a discourse about how computers are making paper obsolete. He explained how words, diagrams, even pictures can all be displayed on video terminals. Finally the disgusted questioner interrupted his spiel. "I wasn't thinking of *that* kind of paper."

Embarrassed, Keith had to admit no one had thought of that problem before. Another student suggested the colonists could use corn cobs. A more cynical fellow proposed using dollar bills.

The average American uses over 600 lbs. of paper and cardboard per year for everything from sacking groceries to paying bills to nose blowing. While much of this use can be cut by conservation, recycling and substitution, a civilized lifestyle requires an unavoidable and non-recoverable minimum.

How will we make paper in space? Agricultural wastes are one source. Many of us have seen those little pieces of paper made from wheat straw with glue down one side. But there are types of paper that require greater strength, softer texture, better acceptance of printing or other qualities which may be hard to get from assorted straw or vegetable stems. The prime source for these papers today is wood pulp.

Hemp, however, produces four times as much paper pulp as trees, and can be used to make rope and twine to boot. As for quality, the Library of Congress says the old hemp paper books are doing well while newer wood pulp books require preservation treatments to keep the paper from falling out like cornflakes when the books are opened.

Decades ago, hemp for paper pulp and rope grew all over Kansas, but not any more. Why not?

When alcohol Prohibition was repealed, thousands of about-to-be unemployed liquor agents were desperate to find another evil to battle. They learned from New Orleans jazz musicians and Texas Chicanos that the leaves, resin and pollen of the hemp plant

were reputed to have euphoric qualities. The liquor agents used this as evidence to get Congress to outlaw the "killer weed."

As a direct consequence, billions of acres of forest have been chewed up for paper that would otherwise have been made from hemp.

So how will space colonists get their paper? Assume that even with heavy substitution—jars and crates for cardboard cartons, handkerchiefs for Kleenex, shopping baskets for paper bags, corncocks—each colonist will still need about 100 lbs. of paper per year. Even with laser propulsion, paper freighted from Earth will cost \$20 per lb. So a space colony of 10,000 would have a \$20 million per year paper import bill. That's a big enough figure to make construction of an orbiting paper farm and mill attractive.

So what will the first space colonists grow for paper? Trees or hemp?

The advantages of trees are they look pretty, and they don't get you stoned.

The advantages of hemp plants are they produce four times as much per acre per year

as trees, they mature fast—just a few weeks under hot-house or space farm conditions vs. four or five years minimum for trees—and they get people stoned.

Let's not kid ourselves. The first space colony will be built by a government (hopefully ours) and a government like ours would never do anything wicked, immoral or fattening. So they'll plant trees.

But when there are a few thousand people in orbit there will surely be a few dozen tempted to try the life of the entrepreneur (selection procedures are never perfect). So as the government pulp crop slowly grows to harvest age, and as each colonist groans under the burden of a \$2,000 per year bathroom tissue and typing paper habit, waiting for the government to deliver on its promise of cheap paper, shady characters will ply a new trade.

"Psst—wanna buy some cheap paper?"

"Well, I dunno..."

"Ever had the urge to use four squares of TP instead of two?"

"Umm..."

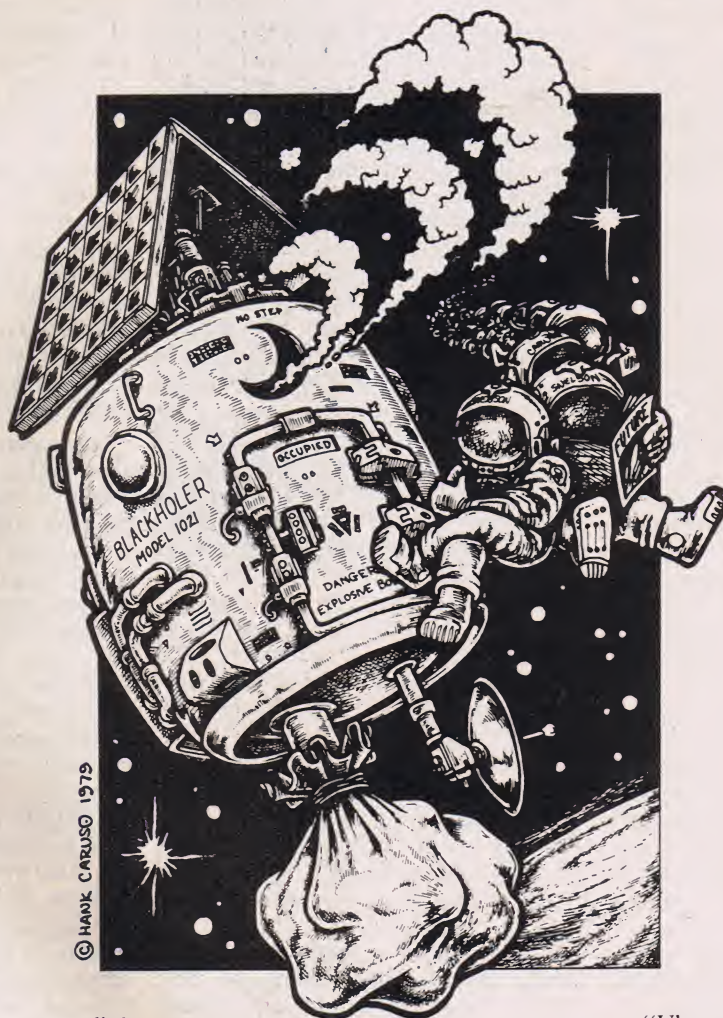
"Tired of scrubbing out snotty hankies?"

"Uh, yeah..."

"Look, I can undercut gov price four to one," and notorious Hank the TP Man flashes open his trench coat to display batches of note paper, envelopes, desk pads, paper towels, brown bags, disposable diapers—luxuries you'd never dreamed of possessing.

How does Hank the TP Man undercut government prices? He and his gang chartered a bunch of used shuttle tanks under the flag of Algeria where the "evil weed" is legal, and filled them with hydroponic hemp crops. He knows that even when the Pulp Authority crop finally comes in that his farm will still be more productive, so he can compete indefinitely. And Hank has an added advantage: hemp byproducts that, by themselves, more than pay for his operation.

However, especially among the naive, there's likely to be some confusion in people's minds between the characteristics of hemp paper and its byproducts. I can hear it now, some colonial dad in the commode bellowing, "Who the hell smoked up all the toilet paper!"



Real Starships

(continued from page 55)

The American physicist F. Winterberg has proposed a possible solution to obtaining the rare helium-3. Perhaps influenced by the hydrogen bomb, in which a small uranium fission device ignites a much larger fusion charge of deuterium and tritium, he proposes to utilize tiny deuterium/helium-3 pellets to ignite much larger pellets of hydrogen/lithium or hydrogen/boron. Such staged fusion micro-explosions promise to greatly reduce the cost and complexity of eventual interstellar expeditions.

Near-term approaches such as pulsed fusion rockets have the disadvantage of long flight times as well as high fuel cost. Even the use of electromagnetic or electrostatic devices to decelerate the vessel by interaction with the interstellar medium will probably not allow a human expedition to achieve velocities in excess of 20 percent of the speed of light. A one-way fusion rocket trip to Alpha Centauri would therefore take 20 years. If the craft were immediately refuelled and returned to Earth, half a lifetime would pass before the crew would return to Earth orbit.

Several more advanced techniques have been proposed to lessen the trip times for stellar journeys. One possible way of achieving fast or relativistic interstellar flight is the use of matter/antimatter pellets.

Nuclear reactions such as fission (splitting of heavy atoms such as uranium or plutonium) or fusion (joining of light atoms such as hydrogen, deuterium, or helium-3) convert less than one percent of the atomic mass into energy. A much more efficient nuclear reaction is the antimatter/matter interaction in which essentially all of the reactant mass is converted into energy.

All subatomic particles apparently have corresponding antiparticles (with the electric charges reversed). Fortunately for us, our part of the universe is entirely composed of regular matter. If a source of antimatter or a method of generating it millions of times more efficiently than is done today in atom smashers is developed, we will have an extremely potent rocket fuel.

Storing the antimatter fuel in electromagnetic "storage rings" (based on those in use in large particle accelerators), an antimatter/matter starship might propel itself as follows: In one approach, pellets containing small amounts of antimatter and much larger amounts of ordinary matter might be fabricated and the output energy from pellet "ignition" would appear as very high fuel exhaust velocity. A far more sophisticated approach is the interaction of equal amounts of antimatter and ordinary matter and the direction of the high energy light out of the back of the ship by a dense electron gas operating as a mirror. Such a ship may be technologically unobtainable but the use of light pressure (photon drives) offers several very exciting alternative star drives, although none of them can match the relativistic performance of the

antimatter photon drive.

An alternative photon drive has been considered by Forward, Norem and Marx, among others. They consider a starship equipped with a large sail of thin, highly-reflective mylar or some similar material. To accelerate, the ship's sail must intercept the beam of an immense laser within the solar system, directed across the trillions of miles of interstellar space. The laser would be powered by sunlight and would have an output power greater than the total present energy production of terrestrial civilization.

Problems of laser aiming would be most critical to this approach. If the beam strayed from the ship's sail the starship and its crew would be lost. If laser aim problems can be solved, and the beam directed over distances of more than five light years, a starship could even use the beam to decelerate by passing the target star, then using the interstellar magnetic field to turn the ship into the beam and approaching the target star from behind. This was the approach used by the "Moties" in Larry Niven's science fiction novel *A Mote in God's Eye*.

Much more research and perhaps much more science fiction has been devoted to another approach, the interstellar ramjet of Robert Bussard. In the relativistic version of Bussard Ramjet, interstellar hydrogen is collected by an electrostatic or electromagnetic scoop within an effective field radius of hundreds or thousands of kilometers. The hydrogen is then funnelled into a fusion reactor—a reactor far more advanced than current technology.

Ramscoop problems do not seem insurmountable and have been investigated by many scientists (including this author in collaboration with Al Fennelly). However, there is considerable uncertainty regarding the eventual feasibility of the hydrogen-fusing reactor.

A much slower, but possibly more feasible ramjet, might be one utilizing the more tenuous heavy hydrogen isotope (deuterium) and/or the helium-3, also available in small concentrations in the interstellar medium.

Other ramjet alternatives include pre-seeding the path of the starship with small fusible pellets, utilizing the interstellar hydrogen as reaction mass and carrying all fusion fuel on board, or accelerating the interstellar ions utilizing laser energy beamed from Earth, as suggested by Whitmire and Jackson.

The romantic appeal of the small, compact relativistic ramjet will continue to attract much attention unless it is finally proven to be impossible. Scientists such as Carl Sagan have commented upon the utility of relativistic ramjets in direct contact between galactic civilizations. The fictional ramjet *Leonora Christian* even circled the universe within the crew's lifetime in Poul Anderson's highly entertaining novel, *Tau Zero*.

All of the above stellar enterprises require large and expensive development programs, technologies so dangerous that stringent national or international controls will be necessary or enormous, and complicated fuel

collection efforts. They share these disadvantages, to a certain extent, with the large space colonies of Gerard O'Neill.

As Freeman Dyson pointed out in his recent autobiography, *Disturbing the Universe*, many successful migrations in human history have not been heavily financed government-sponsored expeditions but have been accomplished on a shoestring by private, often dissident or persecuted groups. The continent of Australia and the Pilgrims' colony at Plymouth were colonized in this manner.


Dyson has commented that terrestrial life may extend itself beyond Earth orbit in the early 21st century by homesteading the Earth-approaching asteroids using appropriate technology and surplus hardware. Using mass drivers (solar-powered electric rockets using anything as reaction mass) and solar sails (thin sheets of aluminized plastic accelerated by the pressure of sunlight), such a modern-day migration could be begun using near-term technology. It would be nice if a "low-technology" approach to interstellar flight existed as well.

The purposes of interstellar colonization are to diffuse terrestrial life throughout the galaxy, to render regions of the universe habitable to life in which life could not evolve unaided, and encourage human social diversity. A comparatively simple star drive to accomplish these goals is now evolving. It could be used for small probes requiring a few hundred years flight time, as well as for 1,000-year arks.

This drive, the space-manufactured High Performance Solar Sail, might be ready for interstellar probes before the turn of the century. These exceedingly thin (1/100,000—1/1,000,000 inch) reflecting sheets would work as follows:

The sail would first be utilized to boost the probe or ship free of Earth orbit. Perhaps with the aid of giant planet rebounds, the sail and a much heavier, dark occluder of similar dimensions would be placed in a highly elliptical solar orbit, approaching the sun's center to within about a million miles (the safe limit, according to Krafft Ehrlicke). At closest approach to the sun, the occluder would be removed and the sail would rapidly accelerate out of the solar system. Peak accelerations for the small probe might be several hundred times Earth's surface gravity (g). Human-occupied ships would have to be limited to 10 to 50 g's.

Probe instrumentation might be deposited on the space-ward side of the sail as a thin film; human-occupied habitats would follow the sails on diamond cables. The concept of journeys requiring a few thousand years might be repugnant to us, but perhaps not to people who have been born in asteroidal habitats.

In fact, in the very far future when the sun enters its red giant phase, the increased light flux from the dying sun will greatly enhance the utility of the solar sail. Four billion years in the future, those space habitats built by the distant descendants of humans might well migrate to other stars on gossamer-thin metallic wings. 

Hazardous Wastes: 77,140,000,000 Lbs. of Trouble

There are several environmental time bombs that tick away louder and louder as America creeps into the 1980s: the dwindling diversity of species, depletion of the ozone layer, acid rains, destruction of wilderness and waterways. But possibly the most severe threat to both humans and the environment involves the hundreds of billions of pounds of hazardous wastes produced in the United States. Where can they be safely disposed of? And, just as important, what is to be done with the hundreds of existing dump sites whose toxic effluents are quickly invading the land? How do we curb further abuse, and who's to pay for all this? Now is the time to sound the warning, to take action.

Generally speaking, hazardous wastes are those unused, unneeded by-products of manufacturing which are in some way harmful. What makes them hazardous is their chemical compositions which, either inherently or through contact with other substances, cause serious damage to humans, animals or the environment in general. These include such modern wonders as PCBs, dioxin, mirex, kepone and TCP. The Environmental Protection Agency defines a waste as being hazardous based on its ignitability, corrosivity, reactivity or toxicity—or any combination thereof. (There is a proposal afoot to also test for radioactivity, infectiousness, phytotoxicity, and teratogenicity and mutagenicity.)

"Hazardous waste" doesn't sound too sexy (teratogenicity?)—nor especially problematic—until you realize just how enormous an amount is produced. And how incredibly devastating it can be.

EPA estimates that this country annually produces 77,140,000,000 pounds of hazardous wastes, and that only 10 percent of that amount is disposed of in an environmentally sound manner. At present, there are approximately 33,000 dumping sites, and literally hundreds—perhaps thousands—of these are potential danger spots.

In October 1978 the House Subcommittee on Oversight and Investigations, chaired by Texas Rep. Bob Eckhardt, launched an investigation into the hazardous waste problem. The result is a staggering report published last September (*Hazardous Waste Disposal*, U.S. Government Printing Office, #96-IFC 31). The document reveals many startling facts and findings, along with a series of recommendations which pose a serious challenge to industry and government.

After reviewing situations in 14 states, the subcommittee found that vast amounts of highly toxic wastes are indeed being unsoundly disposed of, endangering both human health and the environment. The report states



that despite current statutes, the gravity of the situation is being taken relatively lightly by local, state and federal officials; and that EPA has failed to adequately inventory wastes or propose strong enough regulations. In turn, states' handling of wastes has been hampered. Meanwhile, there are hundreds of potentially disastrous abandoned or inactive sites that are being ignored, active sites that operate with little or no regulations and a strong public reluctance toward establishment of new sites. All while neglectful dumping continued. And what about the costs of disposal and cleanup? EPA reports that it will cost between \$13.1 and \$22.1 billion just to deal with present dangerous sites.

What exactly are the hazards of toxic wastes? There are examples of dump sites whose harmful chemicals have leaked into local water supplies. People have received burns from carelessly disposed chemicals. Highly explosive wastes have been stored very near natural gas storage tanks. Radioactive wastes have been found under existing buildings and homes. Roads have been paved with asphalt containing toxic residues. Many of these substances can cause cancer, genetic damage, miscarriages, birth defects—and sometimes death.

One of the most "celebrated" and poignant cases is the one at Love Canal, N.Y. There, 230 families have been permanently evacuated because the landfill their homes were built on is loaded with toxic wastes, including deadly dioxin, which have steadily crept to the surface over the past two decades. Residents complained of various illnesses, chemical burns, animal deaths and an unusually high incidence of miscarriages and birth defects. Though the official word has not categorically linked public health hazards

to the toxins, the evidence surely points to such.

Besides the costs of relocating so many families, someone must also pay to clean up the mess, costs of which have already exceeded \$27 million. (If the wastes had been properly disposed of, it would have cost \$4 million in 1979 dollars.) New York State, which has had to foot the bill so far, is demanding federal relief money, a request that has elicited only a minimum of funds.

Which leads to the question of a waste perpetrator's culpability. The Love Canal site was a dump for a Hooker Chemical Company plant which closed in 1952, and later the landfill was sold to the local school board. A school was built; houses sprung up. Reportedly, Hooker became aware of chemical leaching nearly 20 years ago but failed to take any action, contending later that it wasn't their responsibility.

Should Hooker be held financially responsible for cleanup and relocation? Area residents think so and have filed suits adding up to \$2 billion, and there has been talk of possible criminal prosecutions.

The Resource Conservation and Recovery Act of 1976 contains provisions empowering EPA to deal with hazardous wastes. Thus far, little has been done in the way of promulgating regulations, a fact not taken lightly in the Eckhardt report. It calls on EPA to take up the problem and to fulfill its duties as laid out in RCRA. As well, the study calls for legislation to amend RCRA, increase regulatory funding, create an emergency cleanup fund (with final reimbursement to revert to the perpetrator), an industry-based fee system to deal with future disposal costs, establishment of strict liability of waste generators for damages, and the strengthening of legal recourse and penalties for violators.

Unfortunately, most approaches to solving the waste dilemma have ignored many of the social implications. Not often enough have those involved questioned the continued need for the type of manufacturing that creates such poisons. It is simply assumed that we are destined to produce more and more. Maybe it's time to investigate methods for neutralizing—or eliminating—some of the waste products. Should America be fostering a suicidal lifestyle?

In the past decade the U.S. made great strides in dealing with air and water pollution, enacting laws and regulations that have led to the cleanup from past abuses and making it harder to pollute in the future. Hazardous waste disposal must be approached with the same urgency, for a caustic amalgam is brewing, one that will soon begin to take its toll if left unchecked. These toxic time bombs must be diffused before it's too late.

Rick Sternbach

By ROBIN SNELSON

Rick Sternbach started drawing in 1953. He was two years old and had a lot of encouragement from his father, an architect in Stamford, Connecticut. He liked to draw cars and planes and trains, but by the age of 10 he was already developing a space specialty. He devoured books about space, especially illustrated ones, and discovered the art of Chesley Bonestell. As a high school student he was a model rocket fanatic, a hobby which introduced him to one of the world's leading space enthusiasts, G. Harry Stine. Founder of the National Association of Rocketry, Stine is a real-life space engineer and a writer of science and science fiction. His friendship amplified the young artist's passion for spaceflight.

In 1972, G. Harry Stine showed some of Rick's artwork to his dinner guest, then-editor of *Analog* Ben Bova. "To hear Harry tell it," Rick smiles today, "Ben looked at it and said, 'Okay, we'll give the kid a cover.'"

So began Rick Sternbach's professional career as a space artist. Since that first *Analog* cover in 1973 (illustrating a science fact article on starflight by Stine), Rick's star-splashed spacescapes and meticulous spacecraft have graced most of the science fiction magazines, plus many science and astronomy publications and scores of SF book covers. His painting of Larry Niven's Ringworld—a seemingly unpaintable concept—is classic; lush, candy-colored starfields are his trademark. His style was once described for him, by scientist/science fiction author Gregory Benford, as "mystic realism."

For the past two and a half years, Rick has been involved in some of Hollywood's spaciest productions, working as an illustrator and concept artist on *The Black Hole* and *Star Trek—The Motion Picture*, and in his current job as assistant art director for *Cosmos*, Carl Sagan's upcoming PBS series.

Cheerful and enthusiastic about his work, Rick is right at home designing and executing cosmic visual sequences for television's first science series with special effects. "I'm painting Pluto today," he reported recently from the *Cosmos* artists' apartment located a couple of blocks from KCET-TV in Los Angeles. "It's for a sequence called the Cosmic Zoom. In the first episode it's a trip in from the edge of the universe all the way down to Earth. Parts of the zoom will be used in the rest of the episodes, too."

Three other artists, Don Davis, Adolf Schaller and John Allison, share the *Cosmos*



PHOTO © 1979, ASENATH HAMMOND

art chores with Rick. "At the peak, there were more of us," Rick says. "Jon Lomberg was out here heading up the team. It's been a great experience. We've even been bandying about the idea of doing some sort of film production all together once this is finished. It's a good working team."

While his out-of-town colleagues live in the L.A. apartment, Rick drives south to Irvine, where he's lived for the past two years with wife Asenath Hammond, cats Delaney and Virgil Finlay and a parakeet called Admiral Bird. When he has the time, Rick likes to go scuba diving and he is a professional marine mammal photographer. That interest, coupled with his technology bent, led him to create the spacefaring dolphin on the cover of this magazine.

This vision, which he titles "Cetacean Tomorrow," may at first appear more comic than cosmic, but Rick has concocted a nearly believable explanation for his imaginative scene: "He's a Pacific Bottlenose Dolphin, *Tursiops gilli*," Rick says, "born on December 3, 1985, at the San Diego Marine Mammal Facility of the National Aeronautics and Space Administration. The dolphin has been trained to use a pressure suit specially developed for space-traveling cetaceans. The suit contains a radar-to-sonar converter so the dolphin can scan in-space objects the same way he would underwater. It's also outfitted with a radio, an attitude control system using liquid nitrogen gas jets, a water circulation system and filter to keep his skin wet and clean (dolphins generate almost an entire layer of skin *every day*), and finally, a Stanley Schmidt's "The Promised Land" appeared on *Analog's* cover, showing Earth leaving the Milky Way.

set of manipulators for working inside and out."

It may sound strange, but Rick's intent is not idle fantasy. "The theoretical capabilities of both the suit and the dolphin have been checked out by cetacean trainers and veterinarians," Rick reports. "They all agreed that it's 'different,' but nobody could see any major obstacles."

Although he is best known for larger-scale spacecraft, Rick's one-dolphin spaceship is a good illustration of his curiosity about, and attention to, the factual framework of the sci-fi scenes he paints. Envisioning futuristic hardware is still one of his favorite pursuits, and he got to do plenty of that during his six-month stint as a production illustrator for *Star Trek*. A book of his designs, *Star Trek Spaceflight Chronology* (Wallaby), contains more than 200 of his ship designs. "It was a tough assignment," he says. "A lot of the ships had to be designed from scratch, then I had to create operating specifications, figure out the crew size, and so on."

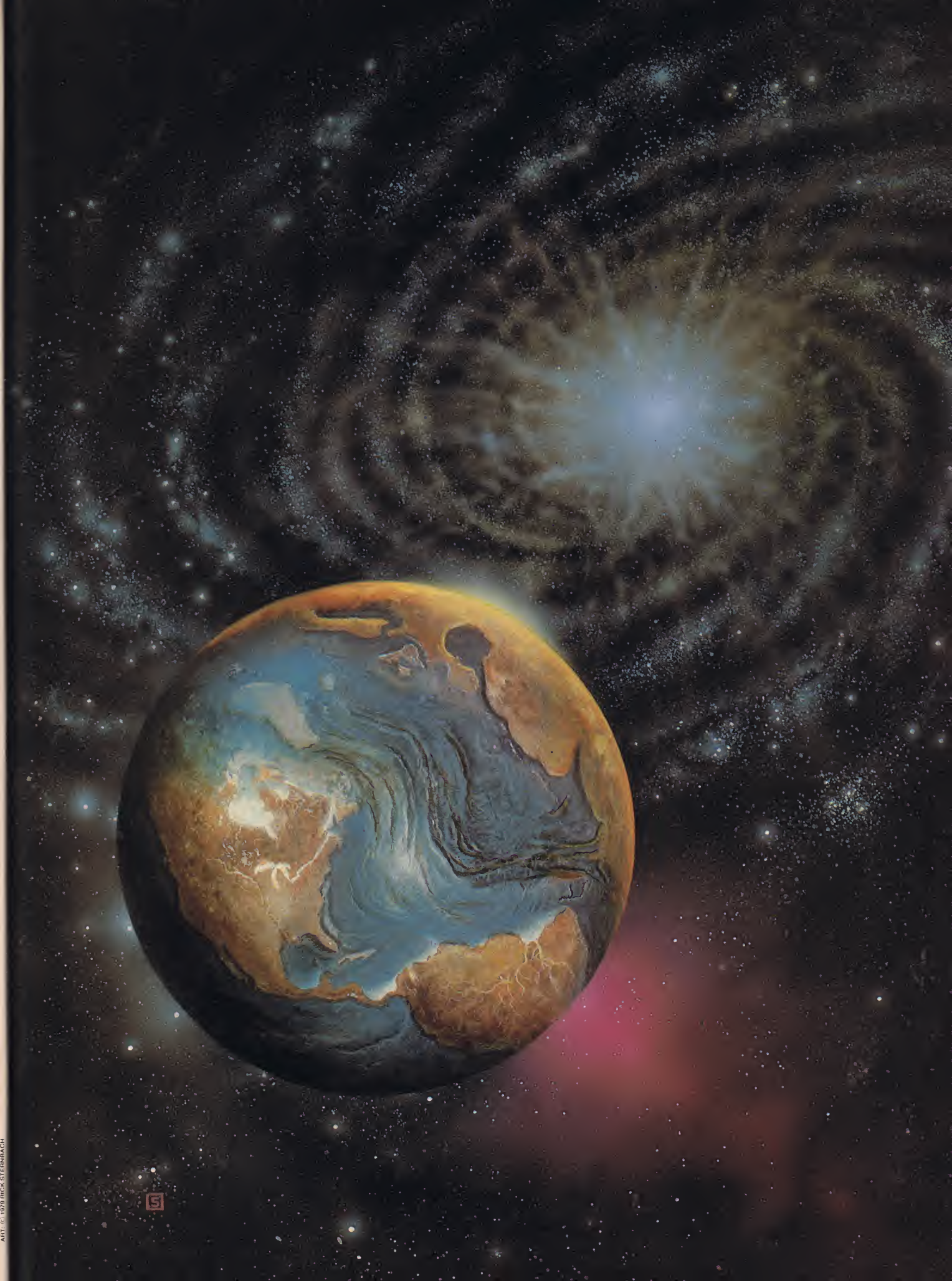
His interest in current-day space planning helps him imagine machines of the future in realistic detail. "Most Hollywood spacecraft may seem utterly implausible, for obvious cinematic reasons. But I believe that with the right thinking they can be made both visually exciting and technically possible."

Rick was inspired to get involved in the film end of science fiction back in 1976, when he saw the first *Star Wars* exhibit at a big Kansas City SF convention. "I got a look at Ralph McQuarrie's pre-production work, and that was the spark. I was intrigued with the prospects for science fiction and astronomy in film, so I decided to gamble on moving out here."

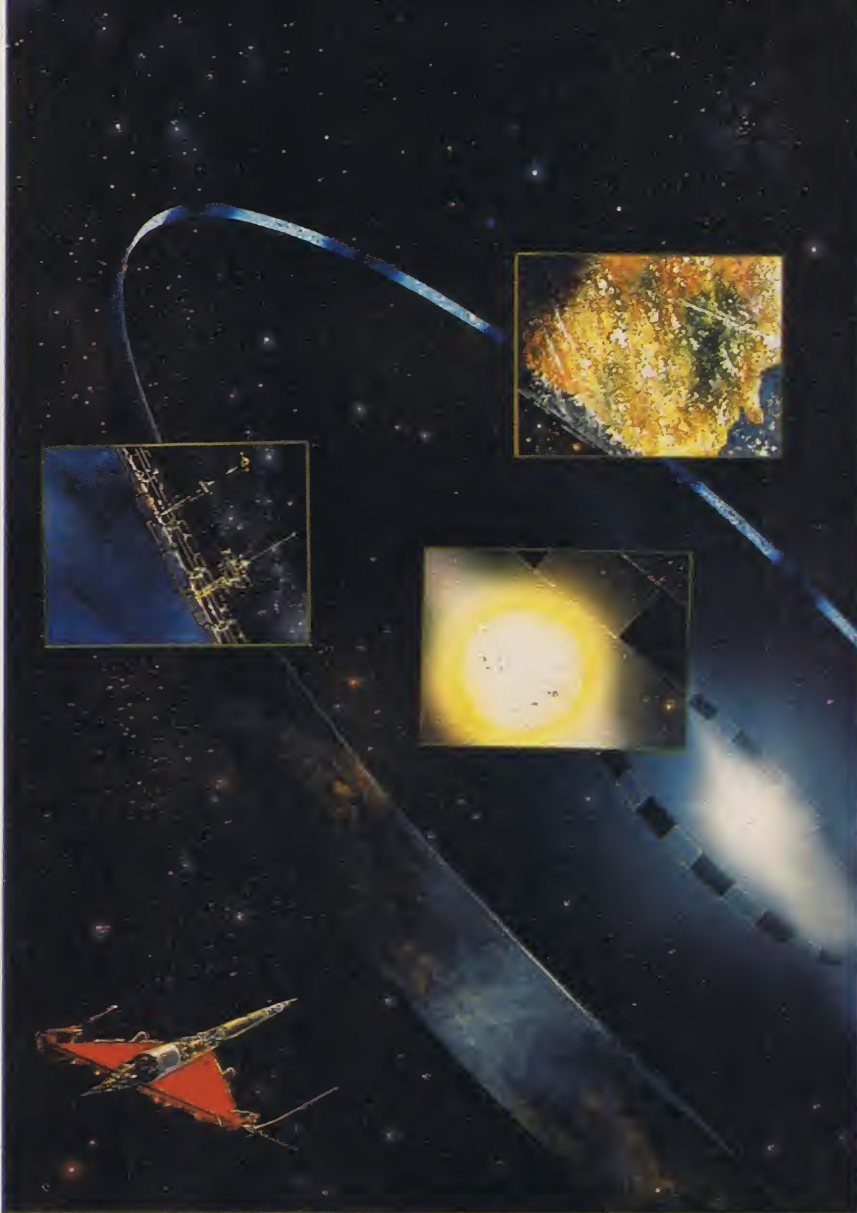
But he didn't really consider that he'd moved from his New Canaan, Connecticut home until he'd landed a job with Walt Disney Studios, working on a production then called *Space Probe One* (now known as *The Black Hole*).

That was in November 1977. Then in January 1978, Disney closed the art department to work on the movie's ailing script. "It was a bit of a shock when they let us go," Rick remembers. "That was my first job in that part of the business. But I found out very quickly that that happened all the time. You come in on a production for a few months, then you go somewhere else."

Despite its abrupt ending, Rick's three-month stint at Disney was a valuable begin-



ART. © 1974 RICK STERNBACH



ART. © 1979 RICK STERNBACH



ART. © 1979 RICK STERNBACH



ART. © 1979 RICK STERNBACH





Above: Sternbach pays homage to the legendary Chesley Bonestell in "The Beginning Of A World, But Whose?"

Top, left: Sternbach's daring representation of Larry Niven's difficult *Ringworld* concept.

Far Left: The artist opts for the pure astronomical art approach in the chilling "Neptune from Trion."

Left: An eye-catching illustration commissioned for the Putnam hardcover edition of Paul Anderson's *The Avatar*.

ning. "There were three of us working there at that time, just trying to get out as many ideas as we could on suits and hand weapons and robots and other hardware that would appear in the film. I liked working for Disney. I was very impressed by their facilities and by the people I worked with. It was very enjoyable."

By the time Asenath arrived from Connecticut, Rick was already scouting other studios for spacey projects, while completing commissioned work from New York publishers. Before too long, he joined *Star Trek*'s production design staff, working with Harold Michaelson, Lee Cole, Mike Minor and John Cartwright. "It was a very friendly and creative crew. I did everything from illustrating the inside of the medical bay and the bridge to dreaming up weaponry and graphics for the inside of the ship—you name it, we did it."

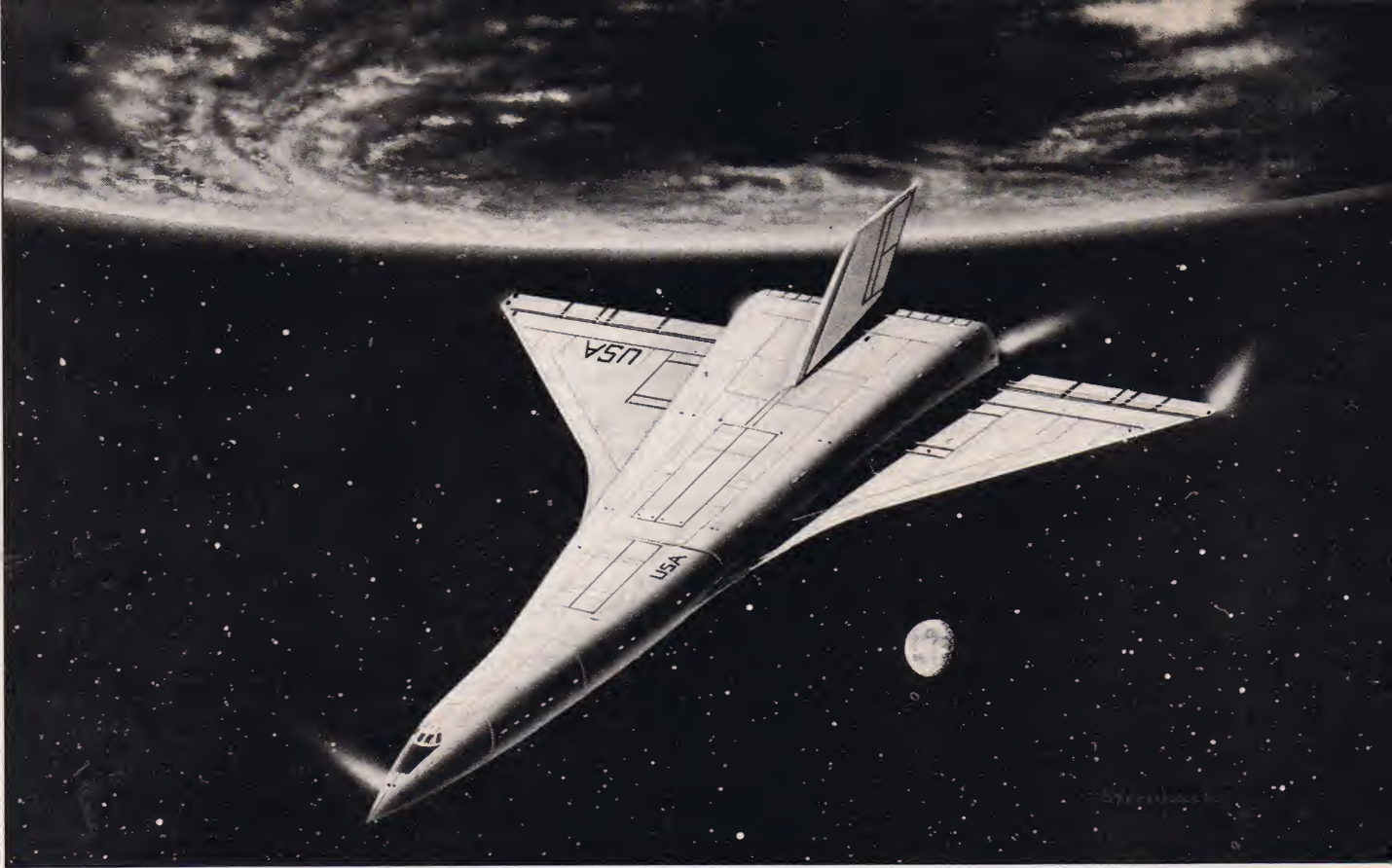
Despite his early and lasting success in the science fiction field, Rick didn't start out as a science fiction fan. His first love was space science; he just picked up science fiction along the way. "Now I'm a discriminating reader of science fiction," he says. "I have my favorite authors—Haldeman, Aldiss,

Tiptree, Niven—but I didn't come out of fandom; I sort of fell into it." Meanwhile, science fiction does have its Rick Sternbach fans; he was voted the Hugo for best professional artist in 1977 and 1978, an award given by science fiction fans.

"That's been an interesting experience to deal with," he says slowly. "For a while I didn't particularly understand the kind of following one gets at a convention. But I learned how to deal with it. Now when an up-and-coming artist approaches me at a convention or somewhere, I'll tell them everything I can. If they want to know how to achieve a particular effect, I try to give a hand. Things like using a toothbrush to spatter stars or the business aspects of how to work with editors and art directors. People helped me. I see no reason why I shouldn't do the same."

Ten years ago, Rick got some advice from Paul Calle, a well-known NASA artist of the Apollo era who lived a few blocks away from him in Connecticut. "Just after Apollo 11 I asked to meet him," Rick recalls. "I went out to see him in his studio in Westport, a huge converted barn kind of studio. He showed me many things, tricks of the trade, and told me






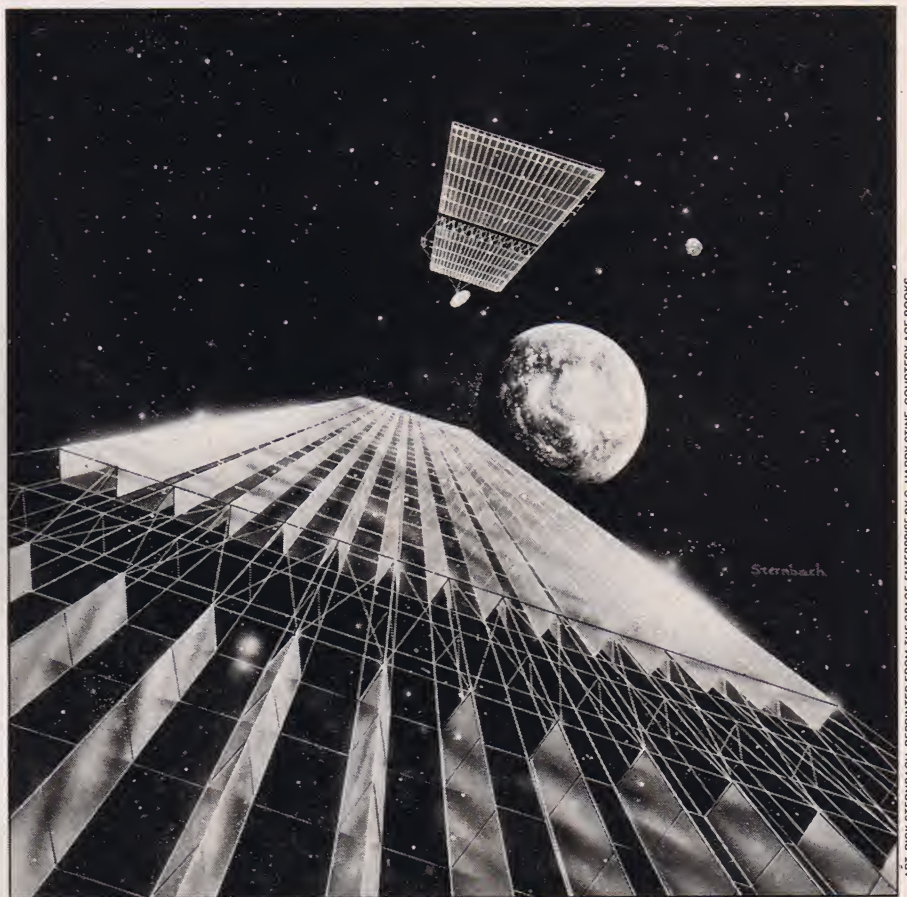
about his experiences as an artist. Then he stopped for a second and said, 'You know why I'm telling you all of this?' I said no. He said, 'Because you're going to do the same thing.' I affectionately call that the Paul Calle curse," Rick laughs. "He was right. But it's not really a curse. I enjoy passing on what I know, because there are a lot of things about working in the field that you don't normally learn in art school."

Undoubtedly, there are yet other things that you can't even learn from successful artists...like how to find someone like G. Harry Stine to champion your cause.

"Harry has been my number one technical influence," Rick says. "I learned a lot from him about the history of spaceflight and some of the engineering. And his enthusiasm—I've known him since 1964 and I have not seen it fade." One of Rick's recent projects was illustrating a new book by Stine, *The Space Enterprise*, to be published this year by Ace.

Like his mentor, Rick firmly believes that our future in space will be exciting and rewarding. "One of the things I'm very interested in right now is inexpensive, mass-produced space habitat modules. I believe that there will be companies, financed by the banks, that will build out there just as they build here. I'm definitely trying to be an optimist in the face of all the reports about the shuttle delays. There are some disappointments, and maybe things don't happen as fast as we would like them to sometimes. But I still think it's all going to happen. We're going to do what we set out to do. We're going to go out there and we're going to build and explore. And yes, I definitely want to go."

NASA take note: As soon as the shuttle is ready to fly into orbit, here's one more space artist who's yearning to paint on location. 



Top of page: Sternbach envisions a horizontal takeoff, horizontal landing shuttle of the 1990s. Such a vehicle would not be much larger than the 1980 NASA shuttle.

Above: Solar power satellites in geosynchronous Earth orbit utilizing huge photovoltaic solar energy collectors. The generated electricity is beamed to Earth.

Left: An astronaut sees the end product of cyclical Mars life form development in this *Analog* cover painting to illustrate *A Martian Ricorso* by Greg Bear.

ART: RICK STERNBACH. REPRINTED FROM THE SPACE ENTERPRISE BY G. HARRY STINE, COURTESY ACE BOOKS.

Disney's ACES

(continued from page 40)

store and secure the camera. The other half is the computer room which is climate controlled for temperature, humidity and dust.

"In addition to moving up and down the track, the dolly has its own north-south, east-west axis. There are 48 inches of travel on these axes at a maximum real time speed of six inches per second. The 68 foot track has a travel speed of three feet per second. All of which are repeatably accurate to within .01 inch.

"The camera itself is mounted on a boom arm. The camera can rotate 360 degrees through the pan and tilt axes, can execute 720 degrees of roll, all at a rate of 36 degrees per second at real time speed, and is repeatably accurate to within .01 degree of rotation.

"The camera is mounted balanced, but should we need to pan or tilt the camera through the nodal point of the lens (the optical center), the computer will calculate the move for us. We tell the computer where the nodal point is and the computer calculates and executes the pan or tilt through the nodal point automatically.

"The point of interest program is useful, too. We can define a point on the model, say, or just a point in space. We'll tell the camera to do a dolly down the track, do a north-south and an east-west move, a roll and a few other things and the computer has the capability of calculating where the moves should go so we will always look at the point.

"We also have a model track which is an

entirely separate piece of equipment. It is identical to the other track physically, but it is portable, and it's about 30 feet long. We can put it anywhere near the camera track. We can set it parallel or crosswise, since the camera track is mounted below the surface of the floor. Once we've defined where the model is for the computer, it will move both of them in relation to each other and still automatically retain pre-selected points of interest, if we so desire.

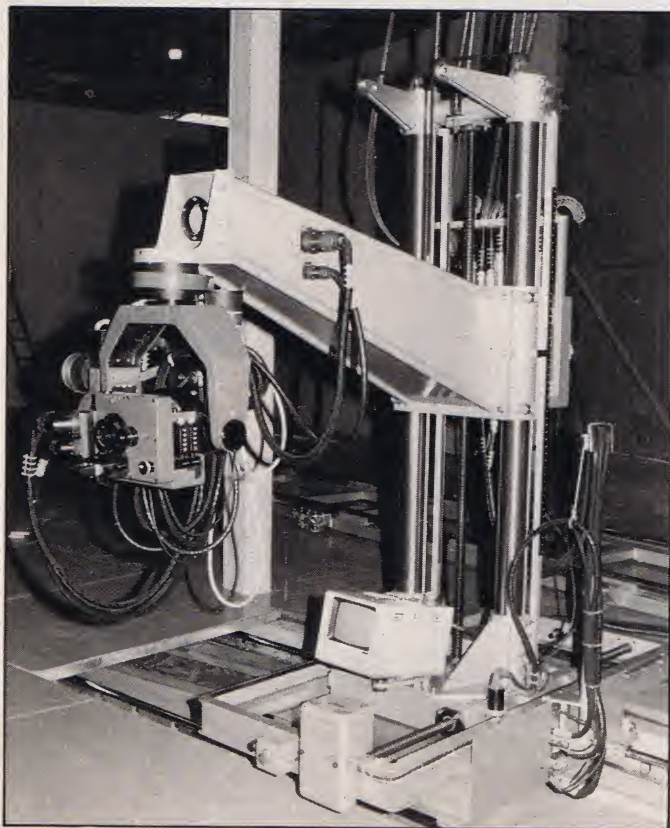
"The model stand is rigged with pitch, yaw and roll axes just like the camera stand. There are additional channels in the computer to run ancillary equipment such as lights or special motors on the model which can be controlled and keyed to turn on and off at precise frames. There is a rear-projection screen that is also computer linked.

"The camera is a marvel of construction from Richardson Design. It can shoot standard 4-perf or 8-perf VistaVision. It can shoot at 24 frames or a time exposure of any duration at all. It was built under our supervision and with our design. But we are not locked into any one camera. At this time the computer program is set to operate with any one of seven lenses, spherical or anamorphic. The TV monitors automatically unsqueeze the anamorphic image so the operator can see the image unsqueezed in rehearsal."

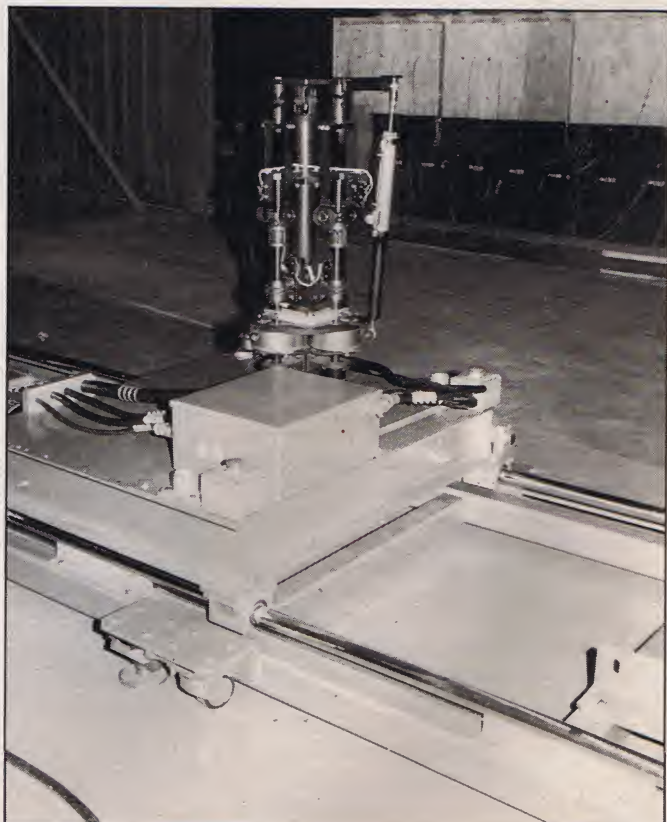
The video monitor system, one at the operator's console and one out at the camera, allows the crew to see exactly what the system is taking during the rehearsal of a shot. If the director isn't quite satisfied with a move within a shot, that move can be altered without disturbing the rest of the shot. The video system is also used to get a 24-frames-

The ACES Team	
Don Iwerks	Project Manager
Bob Otto	Chief Mechanical Engineer
Bill Watkins	Mechanical Engineer
David English	Chief Electrical Engineer
R. David Snyder	Computer Technology and Software Concepts
Stephen Crane	ACES Software Programming
Phillip Stover	ACES Software Programmer
Vic Owens	Computer Interface Engineer
Richardson Design	Camera Design and Manufacture
Northern Precision Labs	Servo Control System
Data General Corp	NOVA 3/12 Computer
COHU	Video Viewfinder System
Walt Disney Studio Machine Shop	Mechanical Manufacture
Walt Disney Studio Electrical Shop	Electric Manufacture

per-second replay of a stop-motion sequence. Each frame of exposure is recorded on a video disc instead of tape, since disc has frame by frame recording capability and can be played back at regular speed after the frames are recorded. This gives the director a high quality image instantly, rather than having to wait for test film to be developed and



The ACES camera crane with video monitor at bottom.



The model stand assembly on its portable track.

PHOTOS © 1979 WALT DISNEY PRODUCTIONS

printed by the lab.

The system is enormously flexible. Iwerks says, "We have used rear-projection with it. We can run any number of other ancillary devices from the main computer—turn lights on and off, command almost any kind of thing to happen at any point in the photography.

"The computer allows us to be very free. If we don't wish to get the shot all in one day, or if we get started at two in the afternoon and it's going to run to 11 or 12, we can shut the thing down at 6 p.m. by telling the computer to fade out at a certain point. In the morning we can come back up to the point that the fade started and make a cross fade back in again, then keep right on going until we finish that day. You will not be able to tell that the shot wasn't done all at one time.

"Some of our scenes took eight to ten hours to shoot, because we had to use exposures of up to maybe 20 seconds per frame—stopped down to carry the focus. This ability to shut down and pick up the next day was a great convenience.

"It is really a marvelous tool to work with—particularly the video system, because a director can plan a shot, program the system in simple terms that a cameraman is used to, rehearse it, look at it on video and make a recording of it. Finally when everybody is happy with the shots and how they cut together, you shoot it.

"All of the information is stored on a floppy disc, so that if at any time in the future you need to do that shot again, all the information is right there—you just load it up and let it run!"

The Disney artists have already been think-

ing of new uses for the system beyond *The Black Hole*. David English describes how the system will be used for Disney's upcoming *Watcher In the Woods*, for which live action has been already shot. "We will take that live action film and transfer it to video tape. Then we will take the video signal of the ACES camera and superimpose that ACES model shot and the live action shot on the model through a video switcher. Using test targets we can perfectly line up the registration of the live action and model cameras, so we can match our miniature shot exactly to the full scale live action shot!" Thus, even though the live action footage was not shot with any sort of motion control recording device, the ACES system will be able to duplicate the movements of the live action camera in scale for the model. The effects shot and the live action will match perfectly.

"We tried to design the ACES system so that it was flexible enough mechanically, electrically and in terms of the software so that it would allow us not only to meet the initial needs of *The Black Hole* but also be flexible enough to meet the needs that would evolve over the course of time. When the decision was made to do *The Black Hole*, the creative people had a long list of fantastic shots that they wanted. We didn't have the equipment to do it. What we finally built was so far superior to anything else available that, after the equipment was built and they saw what they could do, the demands kept getting more and more complicated. And that's good. That's the role that engineering people fulfill in the Disney organization and the entertainment industry in general."

Speed is one of the most significant aspects

of the ACES system. "The video system gives us instant replay and rehearsal capabilities. If we don't like what we see we can edit out any move without affecting the other axes.

"We create a shot by allowing the cameraman sitting at the control console to move the camera to the position that he wants at the start of the shot. He then selects certain key positions; say at frame 200 he wants to be at one position and at 480 he wants a third and at 1500 he wants a fourth position. At 480 he decides to start a pan or a tilt or the model moving or all three. The computer calculates all of the in-between functions for all of the axes at the same time. It does that very quickly at about 1/10 second per frame, so for a 1500 frame shot it takes about two and a half minutes for the computer to calculate all the moves on all of the axes. Then he just punches a button to start the rehearsal and the system takes the camera and model through all of the axes as he watches the rehearsal on the TV monitor—seeing just exactly what will appear on film during the take.

"If it so happens that one axis interacts with another so that the path he had in mind is not what it works out to be, he knows it right away—no waiting for test film from the lab. He goes back very quickly and can change the move to correct what is happening. It makes setting up a shot very fast.

"This capability of the computer to automatically compute the in-between positions comes from our long experience with the audio-animatronic creatures."

The ACES technology may soon expand to other areas in the studio. English explains, "As early as 1971 David Snyder did a proposal to computer automate a cartoon crane, but at that time we were in the process of getting Walt Disney World going. Now we are looking at it again. We hope to expedite the multiplane crane. As it is now, it requires a lot of people to operate it, a lot of time to figure out the moves, and a lot of time to move the equipment in several axes. The ACES system technology is very applicable to that. It could bring the cost of multi-plane animation back to a more realistic level. Now all we have to do is figure out a way for the computer to paint the cels!" laughs English.

"I think with ACES we have given cinematography, direction and production designers a very finely honed tool that can do complicated things very quickly. We hope it will extend the creativity of our artists. It's like trying to build fine furniture with just a few old chisels and hammers—a fine craftsman can do it, but it will take him a long time and a lot of arduous work. Give that same craftsman some modern tools to work with and he'll do a better job in much less time. That's what we hope ACES will provide our people with.

"I've been watching the dailies on *The Black Hole* and I really find it difficult to believe that we shot that. I look at the screen and I look at the model and it still looks like Disney hired a mile long spacecraft and towed it out to the edge of a black hole! That's what ACES in the hands of the Disney artists can do. It's exciting to be a part of it."



The ACES camera tracks a hill and dale form for a traveling air car sequence.

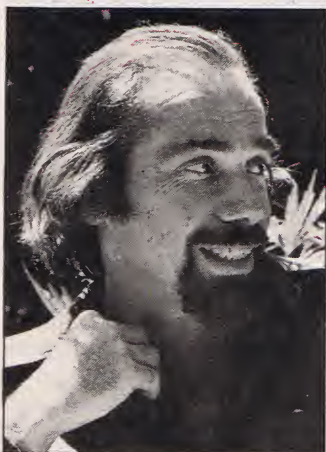


PHOTO: DANIE NOTO

Robert Silverberg, the author of *The Book of Skulls* and *Nightwings*, is one of those rare science fiction writers who can combine quantity with quality. His wonderfully prolific career began in 1954 with the publication of the short story "Gorgon Planet," and in 1956 he was prophetically awarded the Hugo for the year's most promising new author. During the next 20 years he justified that promise by turning out more than 70 books and 200 short stories; among them *Master of Life and Death*, *Recalled to Life* and, later, *Shadrach in the Furnace*.

Around 1974, Silverberg decided that he had produced enough science fiction for a normal lifetime, and "retired" from the field. However, his retirement was actually temporary; he has recently returned with a newly finished novel entitled *Lord Valentine's Castle*. Silverberg now resides in California.

The Future of Urban Living

By ROBERT SILVERBERG

One of the biggest blunders a prophet can commit is to succumb to the fallacy of linearity of causation—that is, to assume that things are likely to go on heading in the direction they're currently going. If that were so, redwood trees would reach to the Moon, the Yankees would win the World Series every autumn for the next fifty (or five hundred) years, and the Dow-Jones averages would be heading for zero or infinity, depending on which way they were going when you made your prediction.

But in fact this kind of straight-line extrapolation rarely gives useful results. Only when the variables in a situation are very few and easily identifiable can we arrive at trustworthy knowledge of the future by projecting trends along a linear track. If the bathtub is full, the drain isn't blocked, the tap is turned off, and we pull out the stopper, one can safely predict the tub is going to be empty in a reasonably short while. But in more complex situations, especially those involving social or biological processes, we need to take into account certain built-in self-correcting characteristics of events that tend to swerve them in directions counter to their original ones. These compensating forces, these feedback mechanisms, are what put the egg on the prophets' faces.

For example, the great social trend in the western industrial nations in the 1950s—a golden age of prophecy—was toward early marriage, early parenthood, and suburban life. The benign economic conditions of those postwar years, the availability of cheap energy (gasoline was 26¢ a gallon in the

United States, power companies cut electric rates every year, home heating oil was all but given away free), and the pent-up demand for comforts created during World War II led to a vast expansion of the population and the development of colossal residential belts surrounding the cramped and decaying urban cores to which workers commuted every day.

It was easy to extrapolate that set of conditions into a straight-line vision of a bland suburbanized future. Cozy little middle-class settlements would form colossal tracts spreading far and wide. Along highways wide and smooth the commuters in their car-pools would proceed, thirty or forty or fifty miles each way, toward their offices in their crumbling old cities; and in the evening they'd high-tail it back to their split-level nests for a few hours with Wifey and their 3.8 children. And so we had horrifying visions of a prepackaged, sanitized, suburbanized society, rootless and centerless, covering the world like a tidal wave of toothpaste.

To some degree that's still happening. A quarter of a century after the first great emigration from the cities, the tract-home developers continue to stake out brave new worlds in the boondocks, the highway-builders lay their plans, the entrepreneurs of shopping-centers unroll their blueprints. But even as the suburban wave slogs doggedly onward, another wave seems to be coming back the other way. What has happened to those crumbling, decaying cities? Nothing left but high-rise office buildings and ghastly bombed-out-looking slums, right? Wrong. Who's living in all those nifty new apartment

towers? Who's that busy rehabilitating run-down but still sturdy houses half a century old? Who keeps all those shops and theaters and parks full of people? Commuters? Ghosts?

Some odd things happened to the western industrial nations on the way to the universal triumph of suburbia. The social dislocations of the 1960s were one of them: The neat little families with the 3.8 children fell apart when Daddy and Mommy forgot how to stay married; the 3.8 children themselves grew up and rebelled against all the trends they were supposed to be following; the old doctrines of marry-young-work-hard-give-your-children-all-the-advantages-you-never-had stopped making sense when children who *had* had all the advantages grew up and took a long, hard look at the system they were supposed to enter.

Suddenly the people who were getting married saw little sense in having lots of children. A substantial number of people didn't even see much sense in getting married. A surprising percentage of the population started announcing publicly that it preferred having sex with members of its own sex rather than in the officially approved way. Homosexuals don't tend to have a lot of kids, and neither do single people and deliberately childless couples. (Not having children became a good deal easier in the 1960s. Not only were abortions illegal and shameful in earlier decades, but in many parts of the United States it was illegal even to give instruction in the use of birth-control devices. And things like the Pill and the I.U.D. were unknown in the suburbia 1950s.)

While the nuclear family was undergoing meltdown and the notion of having children was becoming unpopular, a curious thing was happening to the energy supply that kept all those commuter cars humming and brightened all those neat little homes in the outback. Since we had blithely burned up most of our petroleum in the good old days of the 1940s and 1950s, we had arranged with our friends in the Middle East and South America to sell us theirs for next to nothing. One day in 1973 it occurred to them that there wasn't much we could do about it if they raised the price of oil; so they quadrupled it in a couple of quick easy jumps, from about \$2.50 a barrel to \$10 or so. (These days even the quadrupled price looks cheap.)

It took us some time to discover what had happened to us, like the fellow who continues to grin and take bows after the sword has cut him in half. We went on driving our eight-miles-a-gallon guzzlers, we continued to leave all the lights on around the house, we kept the thermostats nice and high. Because we had all



become good environmentalists during the enlightened 1960s, we also started lawsuits and went on protest marches to keep nasty old coal-burning or nuclear power plants from polluting our neighborhoods. And behold! One day there were shortages of everything that provided energy, and with tears in our eyes we begged the man at the

pump to take a dollar a gallon for his merchandise.

And where did suburbia go?

At a dollar a gallon, a 50-mile-a-day daily commute in a neat little Toyota or Datsun costs \$2.00. Wifey, meanwhile, would be hauling the 3.8 children around in the station-wagon, burning up another \$2.00 a day or

more, except that Wifey now works in the city too, having discovered that there's more to life than being a chauffeur for tots, and there aren't 3.8 children anyway, but more like 1.4, or probably none at all. Suburbia doesn't make sense. And so our cities are bustling with renewed life. Childless couples, free-floating singles, homosexuals, all sorts

of types very alien to the cozy world of the Eisenhower era, now dominate urban life. All those babies born in such swarms between 1950 and 1958 are in their thirties now, or getting there fast; the tastemaking generation, the active generation, and there are *lots* of them. When even a short drive involves a major fuel expense and a lot of hassle at the gas station, living close by the place where one works and plays is becoming not only desirable but almost mandatory.

During the great age of suburban smear, one of the most profound visions of the urban future was that of the architect Paolo Soleri, who pointed out that we could not continue to cover the face of the Earth with housing tracts—at the expense of agricultural land—without eventually starving ourselves to death. Soleri proposed giant buildings that he called “arcologies”—super-high-rise spectaculars with populations of 250,000 or more, whole cities inside a single structure.

building-city. (I wish I had known of Soleri's work before I began my book; he had scores of fine and gaudy ideas that I would have been glad to—ah—incorporate into my projection of the concept.)

The Soleri/ *World Inside* view of the urban future became somewhat less inevitable, at least in the United States, with the startling decline of the birthrate in the 1970s. Where once we fretted about a glut of humanity, now we began to envision ghastly labor shortages, dwindling populations of ever-more-aged folk, and so forth. (But remember my warning about the fallacy of linearity!) Nevertheless, though population pressure does not currently seem as important a factor as it was only a decade ago, other forces—notably our energy problems—are driving us inward, back to the core city; and the same decline in family growth that takes the pressure off us also eliminates much of the rationale for expansion into suburbs, for,

development exhibit a remarkable cyclical consistency, however much the cosmetic details may change.

So the moribund cities of the 1950s are transforming themselves into the glittering metropolises of the 1980s. (Glittering, that is, during the hours when the utilities are able to supply electricity: don't be surprised to see Wednesday Night Blackouts and other such treats coming soon to your neighborhood.) I believe we're heading into a society that will of necessity restore the discontinuity of texture that separates city from countryside, as it was before the great uniformitarian tentacles of suburbia began slithering outward. I think London, New York, and San Francisco are the models for the 1980s, not Scarsdale, Winnetka, and Upper Darby. (Though bear in mind the example of Los Angeles, where a swarm of suburbs have coalesced into a pseudo-city. Given some sort of mass-transit system for the coming age of shortages, that pattern may be repeated in many other regions.)

I don't expect astonishing science-fictional transformations of city life in the next 25 years. Microprocessors, video recorders, home computer systems, and all that will have cosmetic value—the little details of daily life will *look* different in many ways, as they are different now from what they were in 1963—but the basic patterns ought to remain the same: a clustering in high-rise life, a withdrawal from such complexities as home ownership and child-rearing, an avoidance of energy-intensive needs. We are heading into an interesting, fascinating, and probably exciting era—but a difficult and challenging one.

And beyond 25 years? I'd rather not say, for fear of falling into the traps that I've seen snare so many would-be prophets. I expect us to have radically different energy sources—we'd *better*—and quite possibly they will have enabled us to enter into a new era of abundance in which cities are again decentralizing, families are expanding, new towns are springing up in Antarctica and the Yukon and the Matto Grosso. The only safe prediction is that no straight-line projection of trends can be trusted. All sociocultural developments carry their own built-in correcting factors. We are now in the early stages of what is apt to be a pretty traumatic correction of the excesses of the post-war years. I suspect that we'll survive those traumas, and emerge, covered with bruises and bandages, into yet another brave new world—which will set about correcting the trend-lines of today.



“What future, then, for urban life? The pattern now unfolding promises more high-rise development, more emphasis on mass transit and greater intensity of neighborhood life. If that sounds a lot like the 1920s, it's because the actual patterns of society's development exhibit a remarkable cyclical consistency, however much the cosmetic details may change . . .”

Only in that way, he argued, could the ever-expanding human population survive; for the sky-piercing high-rises would absorb our teeming millions into a vertical society, allowing the establishment of huge agricultural belts beyond the urban zones that would provide the food.

Not knowing anything about Soleri's work, I came up with a similar notion about 1968, and developed it into a novel called *The World Inside*. Since population is obviously going to continue to grow at the recent lunatic pace, I said, and since we can't pave the entire world to provide suburban housing for thirty billion people, the only solution is to build upward; and I imagined buildings a mile high, with a million residents, and entire social structures contained within each miniature

without children to provide open space for, it is far more logical for most people to gather once more in urban concentrations.

What future, then, for urban life?

The projection of the 1950s showed dying cities and ever-expanding Plasticvilles in the hinterlands. The projection of the late 1970s shows us the suburbs withering, the cities coming back to life: a systole/diastole of compensating forces correcting trends that seemed uncorrectible not so long ago. The pattern now unfolding promises more high-rise development, more emphasis on mass transit (once thought dead, now dramatically reviving as gasoline shortages develop) and greater intensity of neighborhood life. If that sounds a lot like the 1920s, at least in outline, it's because the actual patterns of society's



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Designing Trek

(continued from page 47)

the uniforms," Lee stresses. "And, believe me, it was hard to plan futuristic signposts that could be recognized by today's audiences. We knew that in the future, things would have changed drastically. But, we figured, some symbols would go on and on. Take the medical symbol, the caduceus (two snakes intertwined around a staff). That goes back to the 1400s or so. We thought it would probably survive into the 23rd century.

"But it was very difficult to come up with symbols that would be universally recognized 300 years from now. We knew that, with all the different aliens aboard the ship, any designs we came up with for the ship's hallways and doors would have to be very similar to the contemporary symbols that are used today in multi-language facilities, like the Olympics. So we tried to come up with graphics that were very pictorial and easily recognizable. I actually went out and got the graphics from the last world Olympics and started futurizing them."

As if these chores were not enough, Lee and her crew had to turn filmmakers and crank out a series of films that were to appear within the film. "I had designed all these marvelous consoles," she laughs. "And we threw in banks and banks of these oval

monitor screens because I thought they looked really pretty and they took up lots of space. A couple of weeks prior to filming, I realized that we had to fill the screens up with something. There was a moment of sheer panic, and then we had to sit down and come up with a batch of films that would represent instrument read-outs, scans and the like. After we had finished them, I figured we were all set. We had this handful of colorful films. They ran out of film within two days.

"Robert Wise said that, since the *Enterprise* was moving farther and farther out in space, the readouts would be constantly changing. Audiences would get bored or annoyed seeing the same read-out films for the entire movie. At that point, the movie started eating our monitor films voraciously. So, during the day, Mike Minor, Rick Sternbach and I would supervise the wiring of the electronics and, all night, we'd be under the animation camera, getting the finished films to the set hours before filming. This went on for a solid year. I guess I art directed about 120 movies for the viewing screens.

"There were times when we had to work half the night and Saturday and Sunday, too. One of my favorite pieces of work in the film was the medical scanning effect that flashes on the large screen when McCoy scans Ilia and discovers that she is a robot. We had to get that one done in one weekend. Mike Minor and I did that on a Sunday afternoon. The room wasn't air conditioned and it felt like it was 200 degrees. I brought in a big pile

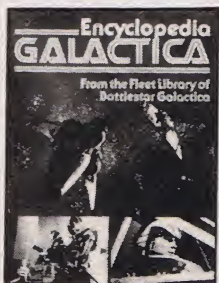
of x-rays and he started working on the x-ray effects from that. I couldn't actually get thermograms to work from so I had to fake it. I did a painting of an infra-red scan of her body and we added other scans on top of it to futurize it. The finished effect is a super-scan: a number of scans done simultaneously. One band shows a thermogram, the other shows her blinking and winking circuitry. That work took us through to Monday night."

Although the work was long and hard, Lee Cole expects that her endeavors for *Star Trek—The Motion Picture* will open quite a few new career doors for her. "Well," she states, "I'm definitely going to keep working in movies but it looks as if I'm going into publishing as well. At one point during the movie, I made up a set of diagrams of all the Star Trek instrumentation as sort of a joke. It was for my crew, who had to wire up the system, and I did it up like a Rockwell flight manual. Within two days, Paramount told me that they wanted to publish it.

"A week or so after that, I put out a xerox copy of all my ship's logo designs so people would know what design went where. Simon and Schuster saw that and called me up within several days. They wanted to publish a whole book of just my graphics and logos. (*Star Trek Peel-Off Graphics Book*, Wallaby) So," she adds with a laugh, "who am I to deny them their pleasure?"

It seems that, from a designer's point of view, envisioning the 23rd century can be both creatively and financially rewarding. [E]

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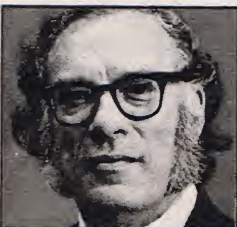
Week after week on NBC's *Buck Rogers In The 25th Century*, spacey hero Buck must deal with denizens of the future on a one-to-one basis. Behind the scenes, the show's costume designers must constantly come up with new and eye-boggling fashions of the future to give the show its continuing otherworldly yet functional look. Next issue, FUTURE LIFE takes a look at what is involved in clothing the future.



PHOTO © 1978 NBC

ASIMOV AT 60

During his first 59 years, Isaac Asimov has proven himself to be one of the most prolific writers of this century, penning over 200 books of fiction and non-fiction alike. Celebrating his sixtieth birthday, Asimov takes a moment to reflect on his past successes and make a few predictions about what the next 60 years will hold; not only for Asimov but for the world-at-large.



TRAINS OF TOMORROW

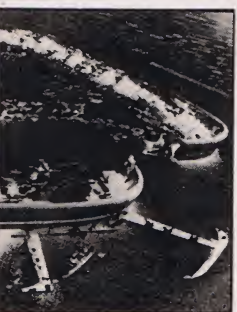
For over 100 years, railroad networks formed the arterial lifeline of most industrial nations. With the coming of super-highways, freeways and jet air traffic, however, the train nearly became an extinct form of transportation. Futurists are now looking to the train as a possible problem solver in a world plagued by gasoline shortages and ecological imbalance. "Trains of Tomorrow" will spotlight some of the newest and sleekest prototypes of proposed locomotives to come.



PHOTO: BRITAIL

SEA CITY

The world is facing an over-populated, polluted and food-scarce future. Is there any way for humanity to continue to live comfortably without drastically altering the surface of the Earth? One possible solution currently being worked on in England is Sea City: a floating, man-made island town that would be artificially warmed, climate-controlled and economically independent. What will life aboard Sea City be like? Next issue, authors Adam Starchild and James Holahan will offer a detailed look at this aquatic existence.



PLUS:

Fantastic designs for futuristic modes of transportation by famed illustrator Syd Mead... The BBC connection: How Britain's science shows make their way to the U.S.A... Space spinoffs: Down-to-Earth applications of space age technology... Charles Sheffield, President of the American Astronautical Society, offers ten futuristic predictions guaranteed to surprise... *Flash Gordon* returns! A preview of Dino DeLaurentiis' \$30 million space opera scheduled for Christmas of '80... A portfolio of Don Dixon's spiciest space art... plus book reviews, columnists' views and Databank news.

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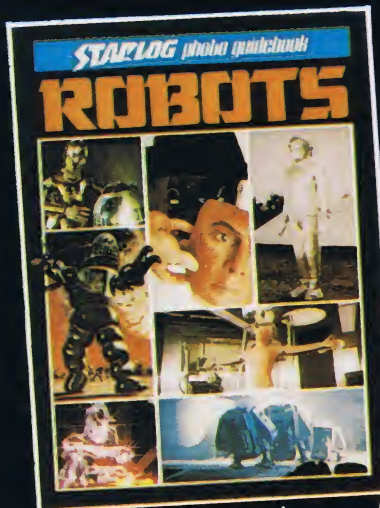
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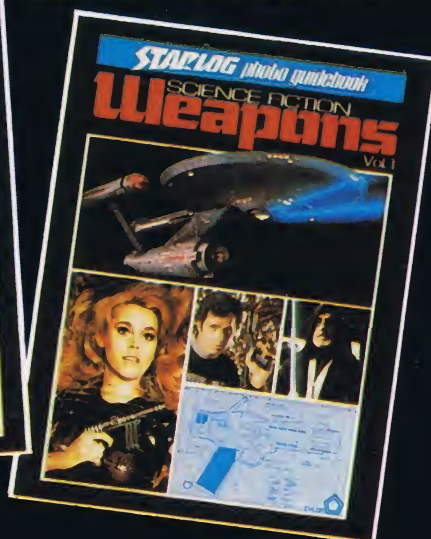
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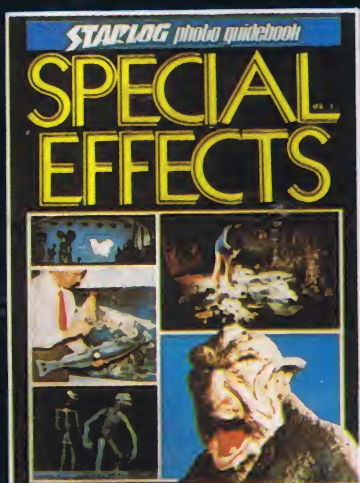
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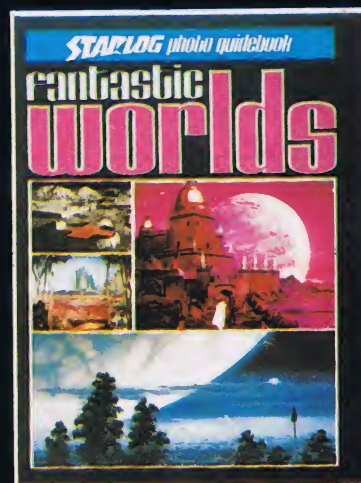
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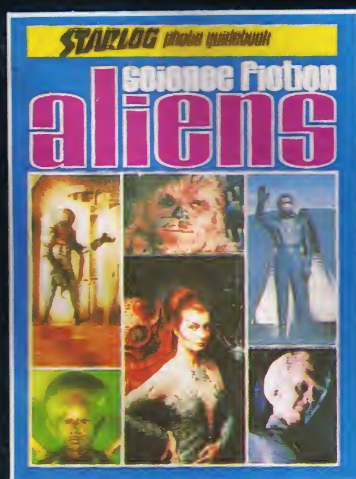
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